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TREATMENT OF TRAUMATIC PARAPLEGIA*

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INTRODUCTION

SPINAL CORD INJURY producing impairment or abolition of power and sensation below the lesion, creates a wide variety of problems. Experience has taught us that the total problem is capable of solution only through team effort involving the full co-operation of neurosurgeon, orthopaedic surgeon, urologist, plastic surgeon, physician, physical therapist, occupational therapist, physical training instructor, nurse, orderly and rehabilitation officer. Volunteer workers have a part to play. Above all, the complete co-operation of the patient is requisite, and this requires that he have a full understanding of the nature of the disability and share in the plan of treatment and retraining leading to the goal of a return to life outside of hospital.

Integration of the treatment program is the work of one of the medical personnel, and in general it is the responsibility of the specialist in physical medicine to carry the patient along from stage to stage and to direct the patient's thinking toward the ultimate goal. However, any member of the medical treatment team may assume this responsibility.

To achieve the best results in the shortest time, it is imperative that the program of rehabilitation be launched at the first contact with the patient in hospital, and all members of the team must share the concept.

For the sake of an orderly presentation, the course of a traumatic paraplegic will be followed from the time of injury. To a certain extent, treatment may fall under general headings of early and late. However, it must be borne in mind that most of the complications of paraplegia may and often do recur, so that continuous medical supervision is required, and all of the various members of the treatment team may be called back repeatedly to render care to the patient.

INITIAL EMERGENCY TREATMENT

When fracture of the spine occurs with injury to the spinal cord, the

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patient should be moved to a paraplegic treatment centre such as exists at the Toronto General or Sunnybrook Hospitals, as expeditiously as possible. Because one cannot assess either the extent or permanence of the cord injury by clinical examination at the site of the accident, all cases must be so handled as to prevent further cord damage. Hence, the patient should be moved with the spine straight, traction being exerted on the head and feet and the torso supported adequately. It requires three or four attendants to achieve this manoeuvre safety (1). The patient should be placed on a flat stretcher in the supine position. If the injury is to the cervical spine, the neck should be extended and sand bags, pillows or an attendant, must maintain the head from rolling.

The clothing should be removed and protection of the skin begun at once. This requires that the skin be kept dry, and the routine of turning every two hours be established. The patient who reaches hospital without pressure sores on his back, is ready for surgical treatment of the spine if such is indicated, whereas an ulcer may defer surgery for weeks.

An inlying catheter—No. 16F, is inserted into the bladder. Shock and complications from other injuries are treated.

Transfer by air is desirable if it means getting the patient to a treatment centre promptly. Adequate medical supervision is available in most parts of this province, but the very essential nursing and orderly services are, as yet, provided in very few locations.

INVESTIGATION AND TREATMENT ON ADMISSION TO HOSPITAL

On admission to hospital, a very careful neurological examination is requisite, both motor and sensory functions being tested and recorded. This forms the basis for prognosis and assessment of the results of treatment. The patient should be X-rayed in antero-posterior and lateral projections, with other views as indicated. The transfer of the patient to the X-ray table and positioning thereon, is carried out with the aid of three or four attendants, maintaining the spine straight.

The dynamics of the cerebrospinal fluid may be of value, for if there is a block before reduction and no block following reduction, decompression has been achieved.

In this centre, paraplegic patients are placed on the Stryker frame, which provides support and immobilization, permits turning of the patient by one nurse or orderly, and gives the patient greater freedom of activity than is provided in bed. Tidal irrigation is instituted for the purpose of maintaining adequate bladder capacity and minimizing infection.

Ideal treatment requires that the injury to the spinal cord be minimized and maximum recovery be achieved, spinal stability be provided, complications be prevented or promptly treated, and the patient be rendered as independent and as useful as possible.

Clinical Features of Paraplegia

During the first few days or weeks following spinal cord injury, the patient is said to be in the state of spinal shock, i.e., the skeletal muscles below the injury are flaccid—there are no deep

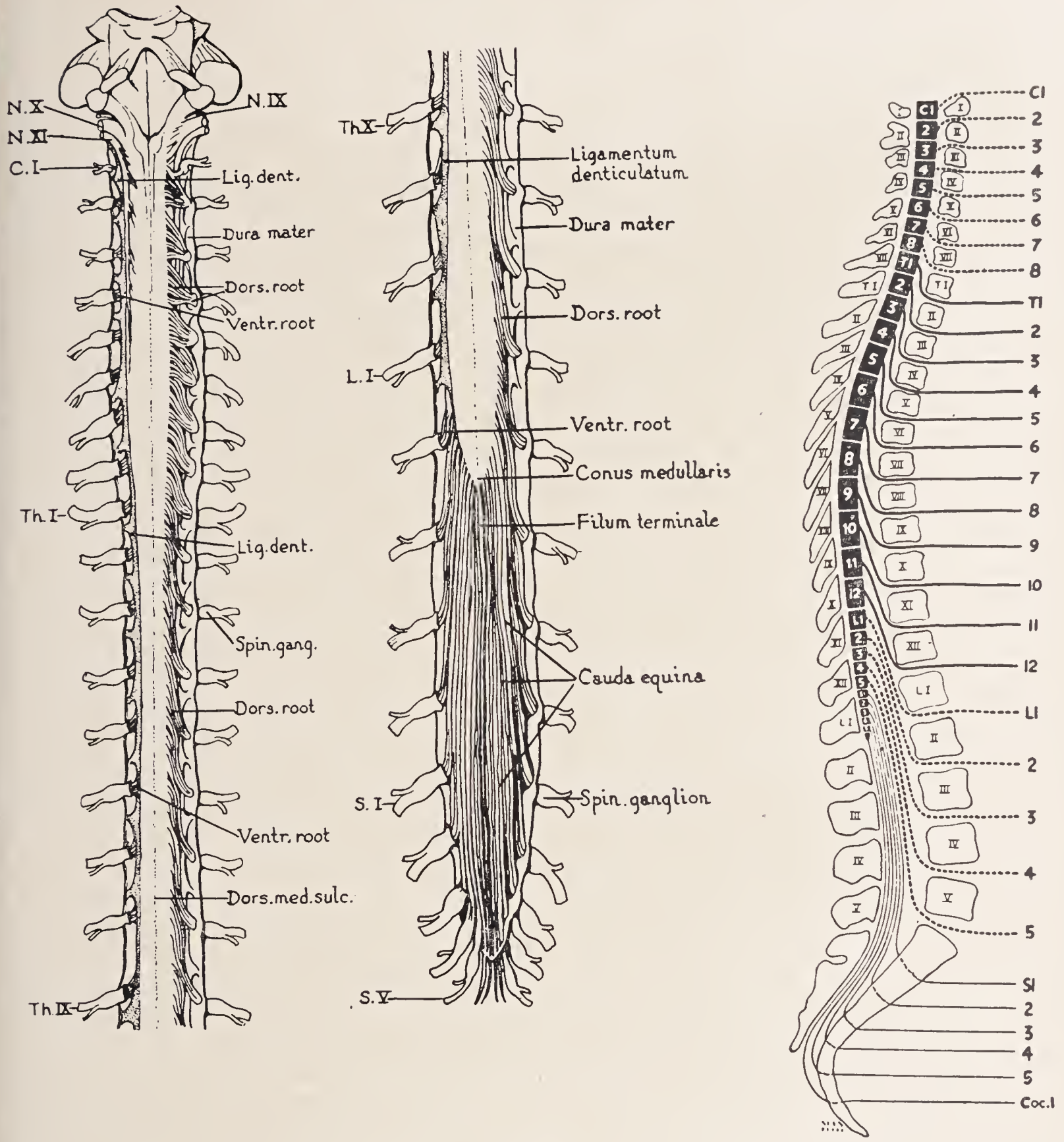

FIG. I

or superficial reflexes. The bladder is atonic.

If the injury is to the conus medullaris or the cauda equina (Fig. I) the skeletal muscles remain flaccid, wasting occurs, reflexes remain absent. The bladder, at first atonic, becomes autonomous, i.e., there are feeble contractions probably mediated through the intrinsic nerve mechanisms in the bladder wall. These contractions expel very little urine, and the residual urine and the bladder capacity are practically the same. Increased intra-abdominal pressure may effectively empty this type of bladder in the absence of obstruction of the bladder neck.

Where the injury is to the spinal cord above the conus medullaris, the reflex arc for motor units entering the cord

below the injury, remains intact. In due course when spinal shock has worn off, the tone returns to the skeletal muscles, hypertonicity develops, and the mass reflex may develop. The deep reflexes are hyperactive and the Babinski sign is present.

In the same manner tone may return to the bladder, so that in response to stretch through filling, contractions of the detrussor muscle occur, and significant amounts of urine are expelled. Such a bladder is a reflex bladder or an automatic bladder.

Prevention and Treatment of Pressure Sores

Pressure sores may be prevented by adequate nursing care. This requires that the patient's skin be kept dry and clean. Incontinence of urine or feces and profuse perspiration, are an indication for a chance of bedding at once. and cleansing of the skin. Turning every two hours night and day or more frequently, is mandatory, and must not be subordinated to any objection raised by the patient.

Maintenance of adequate nutrition by the provision of a high protein, high caloric diet, is essential.

If pressure sores are present, healing is promoted by removing pressure and preventing or abolishing infection. It is questionable if any form of topical treatment such as ointments or ultraviolet radiation, does more than control infection.

For large deep ulcers, the treatment of choice is the plastic surgical procedure of turning a rotation flap. This provides a firm area of skin and subcutaneous tissue over the ulcerated area rather than papery scar-tissue which readily breaks down. Underlying infected bone or tissue is removed at the time of operation.

Abdominal Distension

The intestines frequently become distended during the first week or two following the onset of paraplegia. The abdomen balloons out and the patient is greatly distressed.

To combat this condition a rectal tube is inserted, prostigmine or pitressin administered every four hours, and laxatives and daily enemas administered. Occasionally, continuous suction is required.

Closely allied to this condition is acute dilatation of the stomach, which may occur during the early acute phase, but also occurs in late paraplegia, i.e., years after the injury. Obviously, recognition of the state is important, and early and adequate gastric drainage with suction is necessary for the patient's survival.

Respiratory Complications

Distension of abdominal viscera produces elevation of the diaphragm which prevents aeration of the lower lobes of the lungs. Add to this paralysis of the abdominal muscles which renders the patient incapable of coughing and thus clearing mucous from the trachea and bronchi, and the stage is set for atelectasis, pneumonia and death.

Preventive measures consist of elevation of the foot of the Stryker frame to provide postural drainage, encouragement of deep breathing, relief or prevention of abdominal distension, aspiration of mucous from the airway by suction and assisted coughing, whereby the nurse compresses the epigastrium synchronously with attempts at cough-

ing. Failure of these measures requires bronchoscopy.

The treatment measures described must be instituted immediately, and are carried out along with any surgical procedures which may be indicated.

Surgical Treatment of the Lesion

Surgical intervention for the purpose of exploration and open reduction, is indicated in certain instances. Thus, injuries at the level of the conus medullaris and cauda equina with sparing of some power and sensation, the presence of spinal fluid block together with X-ray evidence of structural dislocation are considered cause for surgical decompression. Where there is immediate complete motor and sensory loss below the lesion, recovery is unlikely to occur no matter what operation is performed. A fracture dislocation of the thoracic or lumbar spine should never be treated by hyperextension alone, in a cast or on a frame. Paraplegia may be produced by this procedure.

Exploration of the site of injury in the thoracic region, is even less likely to contribute to recovery of cord function, yet the same indications are used.

Not uncommonly, there is no cerebrospinal fluid block and no gross disalignment of vertebrae, yet cord function is greatly impaired or completely interrupted. Operation is unlikely to better the patient's state. In certain cases intraspinal studies with X-ray opaque media, contribute to the decision regarding operation.

As paraplegic patients are now expected to live active lives, stability of the spine is required. If such stability is not assured, a few patients will develop further collapse and dislocation when weight is borne by the vertebral column following a fracture dislocation. As it is not always possible to select the cases which will develop this complication, it is often considered advisable to fuse the spine at the site of injury at the time of reduction. Hence, quite apart from the factor of recovery of function, surgical treatment for reduction and stabilization of the spine may be indicated. This procedure may be combined with bilateral partial hemilaminectomy and exploration. A short fusion over two or three segments is preferred, as spinal mobility is then preserved. This measure is important when the level of bony damage lies in the lumbar or lower thoracic region, but is not so essential at higher thoracic levels. Following fusion, a period of immobilization of 14 to 16 weeks permits stability to develop, and when the patient is allowed up, a rigid corset is worn.

Fracture or dislocation of the cervical spine with cord injury resulting in partial or complete paralysis of arms as well as legs and torso, is commonly treated by the application of skull traction for reduction and immobilization.

Such a patient is not placed on a Stryker frame, but rather on a neurosurgical bed on which are placed two mattresses, the lower extending beyond the upper by 12–18 inches at the head end. This permits the application of traction by weights through a pulley arrangement over the head of the bed, the attachment to the skull being effected through skull tongs. The head of the bed is raised to provide appropriate countertraction.

Nursing care of the skin is achieved by turning the patient from his back to the semi-supine position on either side at regular two-hourly intervals.

In the case of cervical cord injury without demonstrable displacement of the vertebrae, it is a sound practice to apply skull traction, as this provides immobilization which cannot be achieved in any other way short of a plaster jacket, and this method of treatment is contra-indicated in the presence of anaesthesia of the skin.

Genitourinary Care

The life span of the patient with paraplegia depends on control of infection of the genitourinary tract. In the past, the majority of deaths have been caused by pyelonephritis, and the death rate was high. The use of tidal irrigation, the advent of antibiotics and sulfonamides and the direction of treatment of the urinary tract by the urologist, have greatly modified the mortality rates.

Initially, a Foley catheter size 16F, is inserted per urethra into the bladder. To this is connected a tidal irrigating unit, the purpose of which is to maintain an adequate bladder capacity by intermittent filling and emptying of the bladder. The control of infection and prevention of phosphatic calculi formation, is achieved by using as an irrigating fluid one which inhibits the growth of the urea-splitting organisms so commonly found in the urine. The fluid commonly used is one-half strength M. solution, a buffered citric acid solution which provides a pH range on the acid side (2).

It is important that the nurses and patient have some knowledge of the way in which the tidal irrigator works, and particularly a knowledge of the signs and symptoms of inadequate operation. In this way continued effective irrigation is successfully achieved.

Supplementary to tidal irrigation is the maintenance of a high fluid intake by mouth, between three and four quarts in each 24-hour period. This assures dilution of urinary sediment and minimizes stone formation in the upper urinary tract. High fluid intake should be practiced by paraplegic patients for the duration of their lives.

The complications which most commonly develop in the urinary tract are —periurethral abscess with fistula formation, epididymitis, cystitis and pyelonephritis with accompanying stone formation. Infection is treated by antibiotics or sulfonamides, provision of drainage and, occasionally, by operation. Periurethral abscess and fistula formation may require diversion of the urinary stream by means of suprapubic cystostomy. The same approach may be required for removal of bladder stones. These are problems for a skilled urologist.

At the end of the period of immobilization required to establish spinal stability, the patient is mobilized in a wheel-chair. If the bladder is autonomous the patient is taught to expel urine by increasing the intra-abdominal pressure, by exerting pressure above the symphysis or, occasionally, by introducing a finger into the rectum and stimulating the mucosa.

If the bladder is reflex, a degree of emptying is effected in response to the distension of the bladder by urine. Successive emptying contractions can be initiated by applying the measures described above.

The objective is to achieve complete or nearly complete bladder emptying several times daily. This prevents the accumulation of debris in the residual urine which may form the nucleus for

stone formation and acts as a breeding ground for infection.

In a few months some of these patients develop a degree of bladder neck hypertrophy which partially or completely prevents bladder emptying. This condition is treated by transurethral bladder neck resection.

In some instances retention of urine results from spasm of the sphincter. This should be dealt with by blocking or sectioning the internal pudendal nerves.

Once the patient is able to empty his bladder, no further need for inlying catheter drainage exists. He is advised that his future welfare depends largely on attention to bladder emptying and on maintaining a fluid intake of 3—4 quarts in 24 hours.

Most male patients require urinals, and female patients must adhere to a routine of emptying the bladder at fixed intervals of 2 or 3 hours. Occasionally they may go for 10 hours without voiding, and remain dry.

Bowel Care

Initially, the bowel is evacuated by the administration of an enema every two days. When the patient becomes mobilized, he is taken to the bathroom and the enema is administered on the toilet. The patient is then taught to give himself an enema. Later still, over half the patients learn to have evacuations regularly without enemas, by using glycerin suppositories or digital stimulation of the rectal sphincter. Laxatives are given in accordance with need. The type and dosage are determined by trial.

The patient must constantly guard against the recurrence of urinary sepsis and pressure sores. In addition, certain complications related to the neurological lesion frequently develop. These are pain of central origin, reflex spasms of such magnitude as to be disabling, and autonomic disturbances which are very distressing.

Pain

A review (3) of 125 cases reveals that pain is experienced to some extent by over 90 per cent of traumatic paraplegic patients, but only 30 per cent find it disabling, and less than 10 per cent find it intractable and require surgical treatment.

Surgical treatment is only considered when the pain is so severe as to prevent progress toward independence and rehabilitation. The remainder of the patients who suffer pain, are advised that activity, improved well-being and an interest in a vocation, will render the discomfort tractable, and this approach is usually successful. As pain is aggravated by bladder distension, infection, general debility, constipation and infected pressure sores, the treatment directed to the control of these conditions is of primary importance.

The surgical treatment of pain commonly consists of spinothalamic tractotomy. Occasionally, section of nerve roots bound down by scar tissue is required, or bony fragments compressing nerve roots, are removed. Bilateral prefrontal lobotomy is a measure which may bring relief in certain instances.

Before operation is decided upon, a careful assessment of the nature, location and severity of the pain is made, together with an evaluation of the patient's personality and his total reaction to suffering.

Treatment of Reflex Spasms

When the involuntary reflex spasms are so severe as to prevent the patient from gaining independence, or when his sleep is constantly disturbed, consideration must be given to ways and means of abolishing the spasms.

Anterior rhizotomy was the first procedure, popularized by Munro. This consists of cutting the anterior or motor roots to the leg and lower torso muscles, usually from T.10 to S.1. Sacral roots 2-3-4 are spared to preserve automatic bladder function. Such a major neurosurgical procedure cannot always be carried out safely, as some of the patients are debilitated. However, the operation successfully abolishes spasms.

An alternate measure equally effective and more selective, is the procedure known as neuromyotomy. The peripheral nerves to the muscles are sectioned and appropriate muscle tendons are cut. In this way spasm may be dealt with in individual muscle groups. Bilateral operations in the groin and in the popliteal spaces, may be necessary.

A third means of abolishing spasm is that of subarachnoid alcohol block. Ten to 15 cc. of absolute ethyl alcohol are injected into the subarachnoid space with the patient supine and in the head down position. The alcohol is lighter than cerebrospinal fluid, and therefore rises toward the anterior nerve roots in the caudal portion of the sac. In a matter of minutes the skeletal muscles of the legs and lower abdomen are rendered flaccid. The bladder is rendered atonic as well, so that the procedure should not be used in persons with automatic bladders which function well, unless one is prepared to train the autonomous bladder which is produced.

It must be borne in mind that a moderate amount of spasm is of use to the patient, so that in selecting a case for a destructive surgical procedure, there must be a clear understanding of the benefits to be gained and the values sacrificed.

For example, a paraplegic who has a chronic chest condition necessitating a productive cough to clear the airway, may be rendered incapable of coughing effectively if the abdominal musculature is rendered flaccid.

Autonomic Disturbances

In patients with upper thoracic or cervical cord lesions, a common syndrome is that of profuse sweating above the lesion, pounding headache, nausea, chilliness with goose-flesh, flushing of the face and tightness within the chest. The patients learn to associate these symptoms with bladder spasm, the administration of enemas or obstruction of the catheter with urinary retention. Clinical experience has taught us that this syndrome is a precursor of an exacerbation of infection in the genito-urinary tract.

The profuse sweating is very distressing to the patient. Rivulets of sweat pour off the face and shoulders, and not infrequently, bed-jackets, sheets and pillows require changing 3 times during a period of 8 hours, at night.

This syndrome represents facilitation of autonomic spinal reflexes in the cord below the lesion, and may be eliminated by subarachnoid alcohol injection. The spinal reflex arc is thus interrupted and bladder and bowel are isolated from the cord; a hypertonic automatic bladder is thus converted into an autonomous bladder. However, it is not always wise to destroy automatic bladder func-

tion, and in a few patients with partial lesions, all power in the legs will be destroyed as well.

A recently developed drug, Banthine, has been found effective in controlling excessive sweating. In proper doses this discomfort is abolished and the unpleasant side reactions from the drug are avoided.

Fracture of Long Bones

When the mobilization of paraplegic patients in wheel-chairs and in braces was first put forward as a desirable measure, there were many dire predictions as to the outcome. No one, however, made mention of a complication which has been quite common and very troublesome, namely, fracture of the decalcified long bones of the legs. To date there have been 24 such fractures in 21 patients. The fractures occurred, for the most part, spontaneously, or with very slight trauma. For example, getting into a car from a wheel-chair, turning over in bed, or falling out of a wheel-chair, have accounted for quite a number of fractures. There were 17 fractures of 14 femurs. In seven persons the tibia was fractured, and in two of these the fibula as well.

The interesting feature about these fractures is, that undelayed union took place following reduction and immobilization, in all but two cases. Immobilization was by plaster in most instances, and pressure sores were generally avoided. One excellent result followed medullary nailing.

Of particular interest is the fact that except when the fracture was into a joint, there was no undue stiffness of joints following immobilization, and in two cases at least, as soon as the cast was removed, movement at the knee joint was freer than one would expect in a normal person.

REHABILITATION

The treatment measures described thus far, are meaningful only if the patient is to become physically active, independent of nursing and orderly care, and is prepared to live a purposeful life outside of an institution. It is therefore necessary that all members of the treatment team and the patient, share in an understanding of the goal toward which each patient is being directed.

Many advantages accrue from having a rehabilitation unit set apart from the active treatment ward. The advantages derive from the fact that patients situated in a special centre such as Lyndhurst Lodge, are permitted greater personal freedom than is compatible with the efficient operation of an active treatment ward.

The treatment in a rehabilitation centre falls under two main headings. The first is the teaching of self-care, so that the patient becomes independent of nurses and orderlies in terms of dressing, undressing, and getting from bed to a wheel-chair and back, from wheel-chair to bath-tub or onto the toilet and back to the wheel-chair; bathing dressing and undressing and control of bowel and bladder elimination, are required of paraplegic patients. Mastery of these seemingly simple daily activities is the *sine quo non* of rehabilitation. On this foundation rests the second part of the rehabilitation program. It consists of general exercises to restore a state of well-being, specific re-educational exercises to strengthen weakened muscles, and ambulation for selected cases. The majority of paraplegics, however, rely on the wheel-chair

for mobility, and many are able to get from the wheel-chair to a hand-controlled car, lift the folding wheel-chair into the back seat, and drive to any destination. Disembarking is executed with equal skill. During this phase of treatment, suitable living accommodation is found and aptitudes are assessed. When the patient is discharged to his home, job placement is attempted.

RESULTS OF TREATMENT

Mortality amongst paralyzed veterans following World War I was high. Various figures are to be found in the literature. A conservative statement would place the mortality at 50 per cent during the first year, and 75 per cent in two years.

Of the World War II veterans returned to this centre, the average period since injury is greater than 7 years. Some were injured as early as 1941. The mortality figures are shown below (Table I). Approximately 10 per cent have succumbed to genitourinary sepsis, the others having died of conditions which are not specifically related to paraplegia. The deaths from urinary infection occurred, for the most part, during the early months after injury before adequate treatment services were established.

Table I

CAUSE OF DEATH	NO.
G.U. Sepsis	11
Coronary Occlusion	2
Cirrhosis of Liver	1
Acute Hepatitis	1
Acute Dilatation of Stomach	1
Malignancy of Large Bowel (not related to paraplegia)	1
Train-Car Accident	1
Not Established	1
Total	19

Apart from the quadriplegic patients, all have gained personal independence. Less than 5 per cent of the complete lesions use brace-walking as a means of locomotion.

Over 50 per cent are gainfully and usefully employed in a variety of occupations such as selling, teaching, clerical work, and operating privately-owned business enterprises.

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PROSTATISM, AND ITS MANAGEMENT

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DEFINITION

Prostatism is the morbid state resulting from urinary obstruction of prostatic origin. The three principal types of prostatic disease producing this condition in adult life are: benign glandular hyperplasia, fibrosis, and carcinoma.

ANATOMY

To appreciate the ways in which prostatism can occur, it is essential to know the anatomy of the gland. One of the active sexual glands, secreting a thin opalescent fluid which serves as a diluent for semen and a nutrient medium for the spermatozoa, the prostate lies at the base of the bladder and surrounds the prostatic urethra. The ejaculatory ducts enter the base of the gland at its postero-lateral angles, obliquely traverse its substance, and emerge into the urethra on either side of the utricular orifices. The division of the prostate into lobes depends upon the relation of the glandular tissue to these ducts. That lying posterior to the ejaculatory ducts comprises the posterior lobe; the remainder (anterior to the ducts) is composed of four lobes: the lateral, on each side of the urethral channel, and connected by a commissure comprising the rudimentary anterior lobe; and the median, located caudal to the urethra. The prostate is surrounded by a dense fibrous capsule, and supported by the pubo-prostatic ligaments, and the anterior fibres of the levator ani muscle.

PROSTATIC HYPERTROPHY

Of the three chief causes of prostatism, this condition ranks foremost, being responsible for 80 per cent of urinary obstruction at the vesical outlet. It usually occurs past the age of 45, and tends to produce symptoms after the age of 50. The increase in longevity that has occurred in the past quarter century has greatly increased the number of males living into the "prostatic age," with a concomitant increase in the incidence of prostatism.

Etiology

The cause of prostatic hypertrophy is unknown, but speculation has indicted a number of conditions, from sexual over-indulgence to celibacy. Recent interest has centred on the male sex hormone, since it has been shown that benign hypertrophy often undergoes complete regression following castration.

Pathogenesis

Initially, small spheroids of hypertrophy appear, taking their origin, apparently, from the mucosal or submucosal glands of the urethra, and not from the prostatic glands. They are encapsulated and have no tendency to infiltrative growth. As they enlarge, they displace the prostatic tissue laterally, and compress it against the fibrous capsule. If the enlargement is of sufficient degree, the parenchyma may be reduced to a peripheral shell, the so-

called false capsule from which the hypertrophied mass can later be enucleated.

Pathology

The gland becomes enlarged, sometimes exceeding its normal weight of 23 Gm. ten fold. Its surface is smooth, its consistency elastic. The enlargement, as a rule, is uniform, though one lobe may be larger than another. Usually, the pathology of benign hypertrophy is limited to the two lateral, and the median, lobes. When the latter is enlarged, it often herniates upwards into the bladder, stretching the sphincter vesicae. When the lateral lobes are involved, the posterior wall of the prostate projects downwards toward the rectum, thereby making the gland palpable *per rectum*. In some cases, the lateral lobes may herniate through the internal sphincter into the bladder, in which case, as in median hypertrophy, the enlargement is not palpable.

The clinical picture, diagnosis and treatment will be discussed later.

PROSTATIC FIBROSIS

This lesion, known also as vesical neck contracture, sclerosis of the prostate, or median bar, tends to occur earlier in life than the preceding condition, and is responsible for approximately ten per cent of prostatism. It usually results from the scarring that follows infections. Such scarring causes contraction, foreshortening, and elevation in the form of a dam, of the posterior lip of the vesical neck.

PROSTATIC CARCINOMA

This condition is responsible for 20 per cent of all prostatic enlargements. Unlike benign hypertrophy, it is usually confined to the posterior lobe. Since it is frequently seen in men without benign hypertrophy, the current impression is that the two conditions are not necessarily related.

Pathologically, it is an adenocarcinoma which ordinarily grows very slowly, gradually invading the gland, and extending beyond the capsule. While the gland in some cases may show no outward signs of change, it is usually enlarged, nodular, and "stony hard." Frequently, it is only after extensive involvement of the gland that carcinoma of the prostate causes the symptoms of prostatism.

PATHOLOGY OF PROSTATISM

As the result of the obstruction and the subsequently increased hydrostatic pressure manifested throughout the urinary system, there are a number of organic sequelae, collectively termed "obstructive uropathy."

As obstruction develops, the bladder musculature attempts to adapt to the increased work thrust upon it, with hypertrophy and trabeculation of the bladder wall. Eventually it is no longer able to expel its contents by contraction, and there is complete retention, or overflow incontinence. The resulting residual urine provides a nidus for infection and calculi formation.

While the bladder undergoes these changes, the ureters dilate, unless the musculature has been rendered inelastic by previous disease. Serious effects occur in the kidney where there is dilatation of the pelvis and calyces by the urine retained under pressure, and progressive atrophy of the renal parenchyma, with impairment of function.

SYMPTOMS OF PROSTATISM

The principal symptoms of prostatism are those of:

1. *Infection,* marked by frequency, precipitancy, urgency, and not infrequently dysuria of a smarting nature.
2. *Obstruction,* indicated by decrease in the force and size of the urinary stream.
3. *Retention,* shown by gradually increasing amounts of residual urine due to progressive vesical decompensation, or the occasional episode of acute retention producing excruciating abdominal pain.
4. *Renal insufficiency,* with loss of taste sensation, poor appetite, fatigue and diurnal somnolence, general debility, and impaired vision. The classical picture, as described by Nesbit, is that of the old man who complains his food does not taste right, is generally fatigued and has a tendency to sleep all day, and to wet himself.
5. *Infection,* which tends to accentuate all the other symptoms of prostation.

TREATMENT

If the patient suffers only the irritative symptoms of prostatism, namely urgency, frequency, or precipitancy, and has no obstruction, belladonna compounds or heat are probably adequate measures.

Once an element of obstruction has been introduced, operative procedures must be considered. Some urologists take as an important criterion for operation the quantity of residual urine; Nesbit, for example, believes that two ounces indicates the need for surgical intervention. Others feel that while the amount of residual urine is important, the symptoms and condition of the patient should be considered first.

SURGICAL MANAGEMENT

Preoperative

The question of preoperative treatment has been the subject of much debate in the literature. Nesbit, and many others, believe that before operation can be undertaken, the patient must be freed from the chief complications of prostatism, infection and renal insufficiency, by urethral or suprapubic drainage. A number of urologists, including Millin, feel, on the other hand, that immediate operation without preliminary drainage is the best approach. Many genito-urinary specialists have come to adopt a more compromising view, letting the decision for or against drainage be determined by the merits of the case. If preliminary catheterization is done, it is usually maintained for seven to ten days.

Methods of Prostatectomy

There are now four principal types of operation on the prostate:

1. Suprapubic prostatectomy
2. Retropubic prostatectomy
3. Perineal prostatectomy
4. Transurethral resection.

The fact that there are four operations used to effect the same cure indicates that the question as to which is the best surgical treatment of prostatism is still unsettled. All these operations have their indications and contraindications, advantages and disadvantages. All have the same purpose, namely, the removal of the obstruction with the least risk to the patient, and with the greatest expectancy of producing a cure. Each will be discussed now in some detail.

Suprapubic Prostatectomy

This is the second oldest operation of the four, and the simplest for the general surgeon. It is a transabdominal, transvesical approach that is entirely extraperitoneal. It can be done in one or two stages, the two stage operation having a lower mortality but higher morbidity than the one stage.

Suprapubic prostatectomy is probably the best operation for soft large benign glands, for cases with associated vesical calculi, or diverticuli, and for large intravesical enlargements of the prostate. It is usually the operation of choice if suprapubic drainage is employed beforehand.

This operation has certain advantages. It is by far the best operation for the surgeon who does only the occasional prostatectomy for it requires less skill than the other approaches. It avoids rectal trauma, and causes least disturbance of the sphincters and sexual function.

Its main disadvantage is its relatively high mortality. Groom, after reviewing 14,800 prostatectomies, found that the average mortality for this operation was 3.3–4.4 per cent, as constrasted with the two per cent average of the transurethral resection, and the three per cent general average for all the prostatic operations in the series. Other disadvantages are the longer periods of postoperative hospitalisation (averaging 21 days, according to Nesbit, against the 11 days of transurethral resection), urinary drainage through the abdominal wound with incisional infection, and occasional episodes of postoperative ileus and shock (Smith).

This operation, according to Poutasse and Harison, is contraindicated by extreme obesity, serious cardiac and pulmonary disease, and general debility.

Retropubic Prostatectomy

This is another suprapubic, extraperitoneal approach. Unlike the last operation, however, it does not entail opening the bladder. As before, complete adenectomy is performed, the hypertrophied nodules being dissected from the false capsule. Developed by Millin of Great Britain, and extensively publicised since 1945, it has been described as a nearly perfect operation because:

1. It is extravesical, and consequently avoids traumatizing the bladder.
2. All the abnormal tissue, except in the case of carcinoma, can be removed, so that recurrences are rare.
3. It is performed quickly, averaging three quarters of an hour, and is therefore less shocking.
4. Both the morbidity and the mortality are lower than that of the suprapubic operation. Hickey, whose mortality figures were only two per cent, envisioned this operation becoming as innocuous as a dental extraction.
5. The postoperative course is smooth, of short duration (two weeks, according to Millin), and requiring little specialised nursing care.
6. Strictures are rare.

The operation has, however, certain disadvantages. It is technically more difficult than the transvesical approach, and requires a surgeon of the right temperament, ability and skill. Some of its complications, infection, hemorrhage, or osteitis pubis, can be very serious.

Its contraindications are, in the main, those of suprapubic prostatectomy.

Perineal Prostatectomy

Although known since the Middle Ages when it was employed for the removal of stone, this operation has never been popular, primarily because of its hazards. Yet it provides the most direct approach, requires only a small incision, and puts little added risk upon the poor risk patient.

Most urologists agree that it is the operation of choice for the *cure* of carcinoma of the prostate. Such a cure can only be effected if the growth has not extended through the capsule, nor metastasized. Perineal prostatectomy is also indicated for the extirpation of abscessed, tuberculous, or calculi - filled, glands.

Poutasse, an advocate of this approach, favours its use in cases of benign hypertrophy where there is great posterior enlargement.

This operation has a number of dangers that limit its use. It is the most likely of all four approaches to cause damage to the rectum, fistula formation, incontinence, and impotence. The latter contraindicates its use in younger patients. It is an operation that must be done by the expert, rather than by the casual, genito-urinary surgeon.

Transurethral Resection

Most urologists agree that this is the hardest genito-urinary operation. It is technically difficult, and the surgeon must be an excellent cystoscopist. Since it was first introduced in 1931, it has been subjected to a number of modifications. Originally merely a tunneling operation, it eventually became an adenectomy for it was found through experience that complete extirpation of the hypertrophied glands not only prevented recurrences in most cases, but also provided a high degree of hemostasis. With the development of the resectoscope and its modifications, the operation has become more refined, but still demanding of optimum technical skill. It has become increasingly popular in this continent; Groom, in his large series, found that more than 80 per cent of the 14,800 prostatectomies had been done endoscopically.

What the indications for this operation are remain as a matter of controversy. Most urologists agree that it is the best operation for contraction of the bladder neck due to fibrosis, for inoperable carcinoma with obstruction, and for enlargement of the middle lobe. It is its use in other forms of hypertrophy that is debated. Nesbit, admittedly an expert at endoscopic resection, uses this operation wherever he believes he can do a complete adenectomy within one hour. Other surgeons, however, believe that only those glands weighing less than 40 G. should be resected transurethrally.

Transurethral resection has the least mortality of the four prostatic operations, Nesbit's figures of two per cent being the average result in a number of centres, and requires the least hospitalisation postoperatively.

It has a number of disadvantages. It is often incomplete for only the surgeon himself knows how effective he has been in his endoscopic adenectomy, and errors in visualisation are always possible; consequently, it is not always followed by permanent cure. Groom, in his series, found that transurethral resection had the highest incidence of postoperative obstruction, persistent infection, and residual urine. The obstruction he attributed to trauma by instruments, and insufficient removal of ad-

enomatous material. Other postoperative complications have been urinary extravasation, incontinence, due to injury to the external sphincter, and urethral stricture. Whether, with further refinements in instruments and techniques, these disadvantages will be overcome, time alone will tell.

Postoperative Management

The most important aspect of postoperative care is early ambulation. Elderly patients, prone to phlebothrombosis if allowed to lay log-like in bed, must be made to move around both in and out of bed, as soon as possible. Indeed, one of the reasons for the decreased mortality with transurethral resection has been the early ambulation that it has allowed, reducing, thereby, the incidence of thrombotic and embolic accidents.

SUMMARY

This has been a brief review of prostatism, and the operations used to cure it. It has been indicated that every surgical technique has its *pro's* and *con's*. It would seem, therefore, that each case should be carefully evaluated, and then operated upon by the approach deemed most advisable. Because of the difficulty of some of these operations, however, it may be some time before such a concept has universal adoption.

ACKNOWLEDGEMENT

I would like to acknowledge my indebtedness to Reed M. Nesbit's excellent book, "Fundamentals of Urology," from which some of the preliminary material on prostatism was extracted. I would also like to thank Dr. N. Roome for his many helpful ideas.

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PATIENT vs. THE REST

Languid I lay, and thou camest O Symmachus quickly to see me;
Quickly thou camest and with thee a hundred medical students.
The hundred pawed me all over with hands congealed by the north wind,
Ague!—before I had none, but now, by Apollo, I have it!

Martial (First Century)

THE SPREAD OF TUMOURS

J. S. SENN, 5T3

INTRODUCTION

TUMOUR is used in the specific sense of a neoplasm, "a growth of new cells which proliferates without control and serves no useful function" (Boyd). This growth continues in the same excessive manner after cessation of the stimulus evoking the change (Willis).

Tumours are usually subdivided as benign or malignant. A benign tumour consists of an abnormal accumulation of normal cells; these cells form a well-defined, slowly growing mass, and rarely cause death, unless by compression of important surrounding structures. A malignant tumour consists of an abnormal aggregate of abnormal cells; these cells form an ill-defined, rapidly growing mass and frequently cause death by their systemic effects.

"Benign" and "malignant" are relative terms. Some benign tumours may spread widely e.g. benign metastasizing tumour of the thyroid and certain angiomas. On the other hand some malignant tumours spread infrequently e.g. Basal Cell Carcinoma of the lip. In many tumours, both benign and malignant elements are found; it is wise to classify such a tumour according to its most malignant part.

According to the above definition, the degree of invasiveness of a tumour is one of the criteria of malignancy. Benign neoplasms grow locally by direct expansion. They form a capsule by compressing the surrounding tissue. Malignant growths spread locally, but also to distant areas. The spread to remote areas occurs by metastasis.

The multicentric origin of tumours must be recognized as distinct from invasion. Willis postulates that tumours arise from small or large "fields" of tissue. These "fields" have been prepared for neoplastic conversion by exposure to carcinogens. It is evident that a neoplasm may arise anywhere in this prepared area; it is also possible that new growths may occur at many places within this prepared "field" at one time. The multicentric origin of tumours is distinct from tumour spread.

The spread of tumours will be discussed under two main headings:

1. Routes of Tumour Spread.
2. Factors Influencing the Site and Extent of Tumour Spread.

1. ROUTES OF TUMOUR SPREAD

There are two methods of tumour spread. Tumour cells which retain their connection with their site of origin have spread by direct means; tumour cells which loose their connection with their site of origin have spread by metastatic means. Direct spread usually occurs early in the tumour's life; benign neoplasms generally spread by this means only. Metastatic spread occurs commonly when a tumour is well established in its primary site; this type of spread is characteristic of malignant tumours.

DIRECT SPREAD: There are five routes of direct spread.

(1) Direct spread by *expansion*:

Surrounding cells are pushed aside and compressed by masses of tumour

cells. Strictly benign tumours spread by this method exclusively.

(2) Direct spread by *infiltration*:

Intracellular invasion of nearby cells takes place in some malignant tumours. Malignant cells frequently invade the protoplasm of striated muscle fibres; the cells of epithelial and nervous tissue are rarely entered. Intracellular invasion is the initial mode of spread by malignant cells. Carcinoma cells invade the large tissue spaces between cells in the subcutaneous tissue and spread rapidly.

(3) Direct "*contact spread*" (Boyd):

"A precancerous change seems to affect the normal cells before the tumour actually reaches them, as if some malignant wave had spread along the surface". This process may occur at the fringes of an innocent papilloma of the colon which is becoming malignant.

(4) Direct spread by *permeation*:

Lymphatic permeation occurs when malignant cells invade the thin walls of lymphatics and grow along their lumen perhaps to regional lymph nodes. Blockage of lymphatics may occur as in carcinoma of the breast; a regional edema results. The loose tissue of the breast expands; the skin which is attached to the underlying pectoral fascia by ligaments is unable to "give". Thus a characteristic dimpled or "peau d'orange" appearance is frequently seen in late mammary carcinoma.

Blood stream permeation occurs less frequently. Thin walled veins are frequently invaded, thick walled arteries are seldom entered.

(5) Direct spread *into cavities*:

Celomic cavities are often invaded by neoplastic cells from surrounding tissues. Lung carcinoma may enter the pleural or pericardial cavities; gastric carcinoma may invade the peritoneal cavity. Cerebro-spinal spaces are infrequently invaded by malignant cells from the central nervous system. Cavities lined by epithelium are sometimes invaded. Renal carcinoma may enter the ureter; tumour spread in the lung may occur from air sac to air sac via the septal pores.

Metastatic Spread: There are three routes of metastatic spread.

(1) Metastatic spread by *lymphatics*:

Fragments of tumour break off from the main neoplastic mass and pass into a lymph channel. Tumour cells spread first to the regional lymph nodes where they are filtered out and may form a secondary growth; later cells may separate from this secondary neoplasm and spread further by lymphatics. Once the regional lymph nodes have been penetrated, widespread dissemination occurs via the large lymph vessels, and perhaps to the systemtic system via the thoracic duct. Carcinoma, and rarely melanoma, spread by this method.

It is useful to remember that lymph node tumours may be primary as well as secondary.

(2) Metastatic spread by the *blood stream*:

The tumour invades blood vessels, usually thin walled veins; fragments of the tumour break off and are widely disseminated by the blood stream. The embolus may be large or small. Large emboli may cause a sudden cutting-off of the blood supply, perhaps producing infarction. Small emboli are commonly filtered out in the capillary area into which they drain. These areas are:

(a) Lungs: receiving emboli from the

systemic veins and right side of the heart.

(b) Liver: receiving emboli from the portal tract.

(c) Systemtic capillaries: receiving emboli from the pulmonary veins or left side of the heart.

Sarcomatous and carcinomatous cells spread by blood stream embolism.

(3) Metastatic spread by *passage across cavities*:

The tumour invades a cavity, cells break off and frequently guided by gravity, implant, on remote areas.

Spread across celomic cavities occurs; cells from carcinoma of the stomach pass across the peritoneal cavity and implant in the pelvis. Cerebro-spinal metastasis occur with glioma and melanoma. Spread also takes place across cavities lined by epithelium; renal carcinoma may produce secondary growths in the bladder.

2. FACTORS INFLUENCING TUMOUR SPREAD

The analogy of the "seed" and the "soil" is useful; "seed" refers to the tumour cell, "soil" refers to the site in which the cell grows. Factors influencing tumour spread are within the "seed", within the "soil", and in the interaction of these two elements.

The "Seed"

Certain factors inherent in the tumour cell may affect its capacity to spread. Some cells are motile (mesenchymal cells), some are phagocytic. Poorly differentiated cells generally spread more rapidly than mature cells. The above properties of the "seed" may contribute to tumour spread, but the main influences within the neoplastic cell causing it to invade are as yet unknown. The secret of malignancy may well reside within the tumour cell.

The "Soil"

Environmental properties are important in determining tumour growth and spread. Certain tissues, such as the liver, seem to be receptive to seeding by secondary neoplasms; other "soils," such as the thyroid, tend to be resistant. Furthermore, one type of "seed" may prefer one particular type of "soil." The following factors may be important in determining the receptivity of tissue to primary and secondary neoplastic growths.

(a) Tissue previously injured by trauma or inflammation may be susceptible to tumour growth; this is not always so.

(b) Tissues with abundant blood supply and numerous capillary beds frequently welcome growths. The receptive liver and lung support this theory; the resistant vascular thyroid is the exception.

(c) The chemical suitability of the environment to the needs of the neoplasm is very important. This factor may easily explain the receptivity of the soil in the above two cases. Chemical variables concerned are; pH, availability of required foods and oxygen, presence of antagonistic enzymes or metabolites and the presence of special growing substances or "trephones". Different types of tumour cells differ in their chemical requirements; it is evident that some sites will provide a more suitable chemical environment than others for the growth of a particular type of tumour cell.

Interaction of "Seed" and "Soil"

The tumour affects its environment in at least four ways. The tumour compresses surrounding tissue. It interrupts the blood supply to surrounding areas by direct means. It also competes avidly against the normal cells for available oxygen and food supplies. Lastly, metabolites and exzymes excreted by the tumour affect nearby tissues. In the above ways the tumour produces death of the surrounding tissue, leaving room for its own expansion.

The environment also affects the tumour. If the stroma is loose, (subcutaneous tissue), spread may be rapid; if the stroma is dense (bone), spread is likely to be slow. If the soil is well supplied by blood vessels, spread will have adequate nourishment, and open channels will provide paths for rapid spread. Finally, chemical substances elaborated by the "soil" may cause a change in the chemical environment such that tumour cells degenerate or grow only very slowly.

An example embracing many of the above factors may be useful. Anaplastic tumour cells in a loosely packed vascular area, such as the breast, may spread rapidly both by direct and metastatic means. The size of the original growth quickly enlarges. The cells at the fringes of this growth absorb much nutriment from the vascular stroma; the central cells of the tumour receive less nourishment and gradually atrophy and die. The tumour is said "to have outrun its blood supply". The dead tissue may change the pH so that adjacent tumour cells may die. In this example we see the variable effects of the interaction of the tumour cell and its environment.

SUMMARY

Tumour spread is discussed. Benign tumours usually spread locally and only by direct expansion. Malignant neoplasms spread locally by direct means, and to a distance by metastatic means. The routes of tumour spread are presented in detail. Factors influencing the site and extent of tumour spread are discussed. These factors are sought first in the neoplastic cell, secondly in the environment of the tumour cell, and thirdly in the interaction of the tumour cell and its environment.

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Perfect happiness for student and teacher will come with the abolition of examinations, which are stumbling blocks and rocks of offence in the pathway of the true student.

Sir William Osler

CASE REPORT

A CASE OF CEREBRAL HEMORRHAGE WITH SUBSEQUENT HEMORRHAGES FROM INCREASED INTRACRANIAL PRESSURE

LOIS A. LLOYD, B.A., M.D.

Dr. A.M., a 71-year old practising physician, was apparently perfectly well at 10 p.m. on September 19th, 1950. At midnight he was found curled up on his right side unable to move his flaccid right upper and lower limbs. He nodded appropriate replies to questions, but could not speak. His right temporal region was slightly bruised and smeared with dried blood. There was a right lower facial paralysis. The left pupil was dilated (4 mm.), slightly irregular and did not react to light or accommodation. The right pupil (2 mm.) reacted normally. The retinae and optic discs appeared normal. The deep reflexes were decreased in the right arm and leg; the abdominal reflexes were absent and a right Babinski response was obtained. The left upper and lower limbs and the left side of the trunk were normal. Sensation was not tested. The chest was clear. Cardiac size and rhythm were normal. The heart rate was 80 per minute. The B.P. was 220/120. No murmurs were heard, but the aortic second sound was accentuated.

The right pupil dilated slowly and became fixed at a size equal to the left one. The patient vomited repeatedly and despite suction began to breathe with difficulty. He became cyanotic and died at 7.30 a.m. on Sept. 20th. Ten minutes following death a lumbar puncture revealed grossly bloody fluid. A clinical diagnosis of hemorrhage into the left internal capsule from the left middle cerebral artery and essential hypertension was made.

At autopsy the brain weighed 1550 grams. A large hemorrhage into the left capsular area probably originated from the left external capsule and ruptured upward into the superior surface and body of the lateral ventricle. This explains the right hemiplegia and difficulty in speech. Marked herniation of the left hippocampal uncus compressing the left oculomotor nerve resulted in the fixed dilated left pupil. Swelling of the left cerebral hemisphere and flattening of the gyri indicated increased intracranial pressure. This would explain the terminal vomiting, dyspnoea and final enlargement and fixation of the right pupil from damage to the oculomotor nucleus. Intrapontine and mid-brain hemorrhage were present and believed due to venous rupture secondary to increased intracranial pressure.

Opinions vary in the literature regarding the origin of brain stem hemorrhages. Blackwood found that secondary brain stem hemorrhages often were associated with a sudden unilateral rise in supretentorial pressure. He felt that the increased pressure may produce distortion of the arteries of the upper brain stem and cause hemorrhage. Moore and Stein also feel that arterial bleeding produces the hemorrhage and they suggest that it is brought on by "reflex increase in the systemic blood picture" (i.e. a rise in systolic blood pressure following a sudden rise in intracranial blood pressure). Greenacre believes that because the vertebral artery is longer and more circuitous than the carotid, the

Photograph 1. Right half of brain stem showing severe streaky increased intracranial pressure hemorrhages in the midbrain and pontine tissues secondary to a massive left capsular hemorrhage. The vertebral and basilar arteries show marked arteriosclerosis. The patient was hypertensive.

basilar pressure increases more and is subject to increased strain in its branches. Moore refers to the frequency of occipital lobe infarction and postulates that it may be due to herniation of the uncus through the incisura compressing the posterior cerebral artery. Against this is the ischemic area of infarction in the occipital lobe compared to the multiple and gross scattered brain stem hemorrhages. Another theory postulates that more marked pressure at the foramen magnum with a fixed basilar artery more exposed to increased intracranial pressure is in favour of the arterial origin of the brain stem hemorrhages.

On the other hand, Scheinker of Cincinnati supports the theory of venous origin of brain stem hemorrhages. He describes early displacement of cerebrospinal fluid from the subarachroid space and the cisterns with swelling of the cerebral hemispheres. This results in lowering of the brain stem and plugging of the tentorial hiatus, blocking the subarachroid and ventricular fluid and oc- including the aqueduct. The cerebrospinal fluid is trapped in the third and lateral ventricles; the superficial blood vessels become kinked, and congestion and stasis result. Anoxic degeneration of the walls of the veins may occur. Specimens show hemorrhages in the nostral portion of the brain stem and in the

periaqueductal part of the mid-brain. Some of the venous walls show almost complete degeneration and the content of the vein merged with extravasated blood surrounding the vessel; the perivascular spaces are distended and filled with large amounts of fluid and red blood cells.

Our specimen, with narrow bands of hemorrhage chiefly in the mid-brain and gross hemorrhages into the pons suggests that it is a similar picture to that described by Scheinker. We believe that these brain hemorrhages are of venous origin and secondary to sudden increased unilateral intracerebral pressure.

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EDITORIAL

HAVE A GOOD SUMMER?

"What did you do all summer?" is undoubtedly the most popular question asked in our Faculty during the first few weeks of the Fall Season. Strangely enough, the answer most readily given from First Pre-Med to Final Year is the one which specifies working in a hospital environment—it doesn't matter where—because "it helps so much with our course."

Being members of a course which by its intensity and often grueling pace, provides us with all the facts we can absorb during the regular University year, we might well wonder if a summer such as is vaguely described by many embryo doctors is the one to be desired. For many of us, High School has not provided much personal contact or experience with "Mr. Anybody" and now in a mature situation we are soon to assume a professional attitude towards people that we do not really know. Yet, in spite of this, many of us spend summers seeing life at hypodermic or First Aid kit range, thus making a closed loop of our Circle of Knowledge, which may one day ensnare us.

Would it not be better, particularly during the early years of our course, to spend the holidays in an atmosphere which eliminates the doctor-patient relationship, and which enables us to meet people as they really exist leading normal healthy lives?

Our undergraduate summers allow us more freedom than we will ever know as graduates. Let's not make them specialized too!

W. E. S.

HIPPOCRATES

S. BAIN, 5T3

INTRODUCTION

Biography

In the fifth century B.C., Greece saw her most glorious age. Pericles gave new impulses to the arts. Heroditus and Thucydides wrote immortal pages of their histories. Phydias carved in marble the pure form of ideal Hellenic beauty. Sophocles and Euripides stirred the souls of the common crowd. Liberty and beauty pervaded all Greece.

Soranus, the Roman historian and physician, whose writings constitute the earliest reliable source, records the birth of Hippocrates in 460 B.C. on the small island of Cos. His father, Heraclitas, a prominent physician of the time, and Hippocrates' good friend Democratus, imparted their knowledge to the man who was to be considered the father of medicine.

Little is known of the exact nature of his travels although there is no doubt that he spent considerable time in Egypt, Libya and Scythia. He may have been in Athens at the time of the plague, although Thucydides expressly states that the medical help during the raging epidemic was generally unsuccessful. Ancient writers clearly recognize his greatness; Plato comparing him in the *Protagoras* to Phydias; Aristotle crowning him "Hippocrates the Great" in his *Politica*; Erotian calling him "the equal of Homer"; and Galen praising him as "the inventor of all that is beautiful."

Hippocrates was certainly the best known physician of his time, a profound investigator, an acute observer, and the head of the most flourishing medical school of his age. His teachings spread throughout the Greek world and beyond.

The Corpus Hippocraticum

The Corpus Hippocraticum is a collection of writings which has, through the ages, been associated with the name of the great physician. The collection contains text-books for physicians and laymen, pieces of research, lectures or essays for medical students, essays by philosophers who were interested in medicine and anxious to apply to it the methods of philosophy. Historical criticism has recently distinguished in this collection medical writings that obviously come from authors in different periods and schools. The most reasonable assumption is that the Hippocratic collection is the remains of the library once part of the medical school at Cos. The works were collected in Alexandrine times to be recopied and perhaps increased by volumes which did not belong to the original collection.

It is only of strict academic interest who the author of these works may be, for the salient truth is that in the latter half of the fifth century, works were written, probably by the same author, embodying a consistent doctrine of medical theory and practice. Under the influence of an outstanding genius, these works set forth a rational empiricism of a strictly scientific character.

GREEK MEDICINE

Philosophic Influence

A knowledge of the earlier and contemporary thought in Greece is essential to appreciate fully the contribution that the Hippocratic school has made in the history of medicine. The fifth century B.C. witnessed the supreme effort on the part of the Greeks to set aside the primitive concept that everything which cannot be explained is the work of a god. They realized that to call normal phenomena "natural" and abnormal phenomena "divine" is to introduce an unscientific dualism. What is divine in one generation, because mysterious, may be natural in the next generation, because fully understood.

At this time, however, another element that equally opposed the progress of scientific medicine, asserted itself. Philosophy had superseded religion. Greek philosophy sought for uniformity in the multiplicity of phenomena. The desire to find uniformity led to guesswork and to the neglect of fact, in the attempt to frame a comprehensive theory.

Thales of Miletus, in the early sixth century, proposed an original principle of the cosmos—the origin of all generation, the eternal element of every form of life and nature. This principle was water. Anaximines carried the ball for the same school by believing that the essential element was air, and that from its condensation and rarefaction are derived the most important phenomena of life.

The first philosophers to take serious interest in medicine were the Pythagoreans. In the early fifth century, Pythagorus established the theory of perfect numbers, and from this, the concept of the universe existing in perfect numerical harmony was derived. To this source the Hippocratic concepts of crisis, critical days, and healing power of nature may be traced.

The most important of the pre-Hippocratic physicians was Alcmaeon of Croton. At the beginning of the fifth century B.C., he advanced the principle that health was a state of perfect harmony, a state of perfect balance between certain opposites. Disease, accordingly, was an expression of a disturbance of this harmony, or an undue preponderance of one of the opposites. (Wet-dry, hot-cold, bitter-sweet.) Later in the fifth century Philolaus regarded bile, blood and phlegm as signs of the discord within the diseased body.

The components of Greek medicine toward the end of the fifth century were:

1. A religious element, which was generally discarded;

2. A strong philosophic element which made free use of unverified postulates in discussing the cause and treatment of disease; and

3. A rational element which relied on accurate observation and accumulated experience. This rationalism concluded that disease and health depended upon the environmental influences on the balanced and harmonious constituents of the body. In *Aphorisms III. I.* the author states that, "It is chiefly the changes of the seasons which produce diseases, and in the great changes from cold to heat, and so on according to the same rule."

At that time, a scientific hypothesis was a generalization framed to explain facts of experience. It was not a foundation but was in itself a superstructure which was constantly being tested by

appeals to sense experience, and retained, modified or abandoned according to the support it received from these facts. On the other hand, a philosophical hypothesis was a generalization framed with a view to unification, and was a foundation which remained untested. The writer of *On Ancient Medicine,* one of the earlier books contained in the Hippocratic collection, points out:

> Medicine has long had all its means to hand, and has discovered both a principle and a method, through which the discoveries made during a long period are many and excellent, while full discovery will be made, if the inquirer be competent, conduct his researches with knowledge of the discoveries already made, and make them his starting point. But anyone who, casting aside and rejecting all these means, attempts to conduct his research in any other way, and asserts that he has found out anything, is and has been the victim of deception.
>
> *Ancient Medicine II.*

The collection contains theories based on philosophical hypotheses, as might well be expected when one considers that philosophy dominated so much of the Greek thinking. This attempt at unification will now be considered in the discussion of the Hippocratic concepts of crisis and critical days.

Concepts in Hippocratic Writings

We have seen that, when the philosophic thinking took a biological turn, the Ionian and Pythagorean philosophies produced the concept of health as a state of perfect harmony within the body. To this source the theories of the Humors, Coction, Crisis and Critical Days may be traced.

Humors.—The commonest complaints in Ancient Greece were diseases of the chest (pneumonia, pleurisy, and tuberculosis) and malaria. Recalling how Philolaus regarded phlegm, blood and bile as signs of discord within the body, we may now see in part how this concept arose. Each of the humors was suggested by a disease: phlegm, by the group of chest diseases, blood, by the hemorrhages in fevers, yellow bile and black bile, by the vomits in remittent malaria.

Since the Hippocratic writings are a collection from varied sources, some of which held divergent views, many contradictions exist regarding the number and the types of humors. However, one common principle may be found in all these theories—health is a harmonious mingling of the constituents of the body. What is meant by a constituent or what is meant by mingling, is not made clear.

Coction.—To the Greek physician, coction was the action which so combined the opposing humors, that there results a perfect fusion of them all and no one humor remains to cause trouble or pain. Although we are familiar with the difference between a chemical and mechanical mixture, it is difficult for us to fully appreciate what is meant by terms used when this distinction was unknown. Coction is a process neither purely mechanical nor purely chemical. Coction blends the opposing humors so that harmony is once again restored. In the following passage from *Ancient Medicine XVIII,* the writer shows that as the patient recovers from the common cold, the discharges become less acrid and thicker as a result of coction.

> "In the first place, those of us who suffer from a cold in the head with discharge from the nostrils, generally find this discharge more acrid than that which previously formed there and daily passed from the nostrils; it makes the nose swell, and inflames it to an extremely fiery

heat, as is shown if you put your hand on it. . . . But in some way the heat of the nostril ceases, not when the discharge takes place and the inflammation ceases, but when the running becomes thicker and less acrid, being matured and more mixed than it was before, then it is that the heat finally ceases. . . . Where acrid and unmixed humours come into play, I am confident that . . . restoration results from coction and mixture."

Crisis and Critical Days. — The struggle between nature and disease was decided on the day that coction took place. The result was partial or complete recovery, aggravation of the disease, or death. Crises took place on what were termed critical days. A general law was established that acute diseases had crises on one or more fixed days in a series. For fevers the series was 4—7—11—20—34—40—60. Crises occurring on any day other than that scheduled in the series indicated a probably fatal relapse. The reason why this particular method of prognosis met with with considerable success may be appreciated on considering that, in malarious countries, latent malaria colors all complaints and all diseases tend to grow more severe periodically.

Prognosis

It is remarkable that Hippocrates attached no great value to diagnosis. Although classification and diagnosis of diseases were always in the background, they played a role of minor importance in medical practice. The persuasive powers of the Greek physician were used to their best advantage in winning the confidence of his patient, for at that time anesthetics were not available for surgery and the art of nursing was in its infancy. In addition, practitioners often wandered throughout the countryside, and as the establishing of a reputation in one district was difficult, such a method as accurate prognosis for winning the confidence of the community was essential. The following paragraph is taken from *Prognostic I.*

"I hold that it is an excellent thing for a physician to practise forecasting. For if he discover and declare unaided by the side of his patients the present, the past and the future, and fill in the gaps in the account given by the sick, he will be the more believed to understand the cases, so that men will confidently entrust themselves to him for treatment. Furthermore, he will carry out the treatment best if he know beforehand from the present symptoms what will take place later. Now to restore every patient to health is impossible. To do so indeed would have been better even than forecasting the future. But as a matter of fact men do die, some owing to the severity of the disease before they sumon the physician, others expiring immediately after calling him in—living one day or a little longer—before the physician by his art can combat each disease. It is necessary therefore to learn the natures of such diseases, how much they exceed the strength of men's bodies, and to learn how to forecast them. For in this way you will justly win respect and be an able physician. For the longer time you plan to meet each emergency the greater your power to save those who have a chance of recovery, while you will be blameless if you declare beforehand those who will die and those who will get better."

The same book contains a description of the prognostic signs which indicated a fatal outcome to the physician. The Hippocratic facies:

"Nose sharp, eyes hollow, temples sunken, ears cold and contracted with their lobes turned outwards, the skin about the face hard and tense and parched, the color of the face as a whole being yellow or black."

MEDICAL ETHICS

Although the Hippocratic writings which deal with the various medieval theories and which describe clinical observations in accurate detail, are of historic interest, those writings which set forth a standard of medical ethics have contributed more to the development of Medicine as an Art. The principles of medical ethics which are found in these works have been perpetuated as a standard of medical practice to this day.

The Greek physician obeyed these rules of etiquette, not through fear of punishment by a general medical council for none existed, but for the love of his art. Because the sanction was comparatively weak, the scope was comparatively wide, and these laws were comprehensive because their observance was a matter of honor.

The first of the following series of extracts might well be considered the text of an address given to medical students at the beginning of their studies.

Medicine is the most distinguished of all the arts, but through the ignorance of those who practise it, and of those who casually judge such practitioners, it is now of all the arts by far the least esteemed. The chief reason for this error seems to me to be this: medicine is the only art which our states have made subject to no penalty save that of dishonor, and dishonor does not wound those who are compacted of it. Such men, in fact, are very like the supernumeraries in tragedies. Just as these have the appearance, dress and mask of an actor without being actors, so too with physicians; many are physicians by repute, very few are such in reality.

He who is going truly to acquire an understanding of medicine must enjoy natural ability, teaching, a suitable place, instruction from childhood, diligence and time. Now first of all natural ability is necessary, for if nature be in opposition everything is in vain. . . .Moreover, he must apply diligence for a long period, in order that learning, becoming second nature, may reap a fine and abundant harvest. . . . There are in fact two things, science and opinion; the former begets knowledge, the latter ignorance.

Law I, II.

In *Precepts,* there is contained some very practical advice regarding fees.

This piece of advice also will need our consideration, as it contributes somewhat to the whole. For should you begin by discussing fees, you will suggest to the patient either that you will go away and leave him if no agreement be reached, or that you will neglect him and not prescribe any immediate treatment. So one must not be anxious about fixing a fee. For I consider such a worry to be harmful to a troubled patient, particularly if the disease be acute. For the quickness of the disease, offering no opportunity for turning back, spurs on the good physician not to seek his profit but rather to lay hold on reputation. Therefore it is better to reproach a patient you have saved than to exhort money from those who are at death's door.

Precepts IV.

The nature, character and attitude of the physician are well described in the books *The Physician* and *Decorum,* from which the following extracts are taken.

The dignity of the physician requires that he should look healthy, and as plump as nature intended him to be; for the common crowd consider those who are not of this excellent bodily condition to be unable to take care of others. . . . The prudent man must be careful of certain moral considerations—not only to be silent, but also of a great regularity of life, since thereby his reputation will be greatly enhanced; he must be a gentleman in character, and being this he must be grave and kind to all. . . . In every social relation he will be fair, for fairness must be of great service.

Physician Ch. 1.

. . . the physician must have at his command a certain ready wit, as dourness is repulsive both to the healthy and to the sick. He must also keep a most careful watch over himself, and neither expose much of his person nor gossip to laymen, but say only what is absolutely necessary. . . .

Decorum VII.

When you enter a sick man's room . . . bear in mind your manner of sitting, reserve, arrangement of dress, decisive utterance, brevity of speech, composure, bedside manners, care, replies to objections, calm self control to meet the troubles that occur, rebuke of disturbance, readiness to do what has to be done.

Decorum XII.

Of all the Hippocratic writings, the *Oath* is probably the best known landmark in the ethics of medicine. The date of the Oath, who took the Oath, and what binding force it had, is unknown. It is felt by some historians that it might be some sort of bond between teacher and student, embodying certain moral rules of practice and a promise to act in a certain manner toward fellow practitioners and students. Another suggestion has been that the Oath might have been taken by members of a secret medical society. Certain clues establishing the existence of such societies are contained in the collection. It does not matter which of these theories the reader accepts, for the significance and value of this writing rests in the fact that here are the noble rules, and loyal obedience which has raised the calling of the physician to the highest of all the professions.

The spirit of Hippocrates will long live with us while we remember his first Aphorism:

Life is short, the Art long, opportunity fleeting, experience fallacious, judgment difficult.

Aphorisms I.

REFERENCE

Hippocrates, Vol. I-IV, W. H. S. Jones, Translations.

ODE TO A COLOSTOMY

O Colon Osteum, what ho (le)?
Could you but speak, what you could tell!
You're but a substitute, I know,
And yet you serve me, times, too well.

Before my operation, friend,
I had a colon, end to end;
But since you're out in half, you see,
A semi-colon you must be;
And, therefore, only half as sound
As when you went completely 'round.
A query too: each day a care:
I'm never sure just how your are.
And yet I'm glad that you are there;
A period would be worse, by far.

J. H. C.

ABSTRACTS

MEDICINE

Cardiac Symptoms: Parkinson, J., Annals of Internal Medicine, **35:** 499, Sep. 1951.

The two main cardiac symptoms, pain and dyspnea, are discussed. Pain is classified as being due to coronary artery disease, or unassociated with arterial disease. Anemia, paroxysmal tachycardia, rheumatic valvular disease all produce pain without coronary artery involvement. The pain produced is similar to angina. Painful coronary disease is called angina pectoris. Angina may occur at rest, with exertion or may be persistent as with infarction. The location of anginal pain is important. It may be retrosternal, in the arms, interscapular, in the lower jaw. Characteristically, angina comes with effort. The differential diagnosis of angina includes left inframammary pain, indigestion, gastric or duodenal ucer. To treat anginal pain instruct thc patient to avoid exertion, and use amyl nitrite or nitroglycerin prophylactically or for pain relief.

The author says that dyspnea shows the inefficiency of the heart. Progressive dyspnea and paroxysmal nocturnal dyspnea arc the two main types. Noncardiac dyspneas must be ruled out. These are: (i) of pulmonary origin—bronchitis, emphysema, carcinoma of lung; (ii) obstructive dyspneas—retrosternal goitre; (iii) blood diseases, anemia; (iv) obscurc heart disease such as coronary artery narrowing, aortic stenosis: (v) psychogenic dyspnea—either of thc tachypneic type or like a deep sighing respiration associated with great anxiety.

Thc author considers the above symptoms of dyspnea and pain responsible for the first contact between the cardiac patient and the doctor.

D. C. Brown

Familial Pulmonary Fibrosis: MacMillan, J. M., Diseases of the Chest, **20:** No. 4, 426, 1951.

A scries of cases of chronic pulmonary fibrosis taken from three familial groups is presented. On thc basis of these and other cases studied in the files of the Iola Sanitarium the author feels that sufficient clinical and pathological data is offered to warrant the establishment of a new disease entity, Familial Pulmonary Fibrosis. This is a familial keloid response to chronic pulmonary insult of an infectious, organic or inorganic nature, formerly misdiagnosed under such common or broad tcrms as tuberculosis. pulmonary fibrosis, chronic interstitial fibrosis, post-infectional fibrosis, chronic pulmonary granuloma, Boeck's sarcoid, fungus disease, chronic pulmonary lymphangitis.

The family groups presented include successive generations, identical and nonidentical twins, and siblings. Age incidence is 30 to 55 years and there is a predominance of females.

The cases are characterized clinically by chronic respiratory infection leading to dyspnea, cyanosis, orthopnea and progressing usually to respiratory death. Patchy and interstitial fibrosis, alveolar dilation and dilation of pulmonary vessels are characteristic. Cor pulmonale is a constant finding which is thought to be a terminal development and not part of the disease process.

The possibility of potassium iodide being an inhibitor to the increasing fibrosis warrants further investigation. In every case it seems to exert beneficial influence and three progressive cases have become stationary. It is felt that in investigating these cases a detailed family history, with an emphasis on the manner of death rather than diagnosis, is necessary.

R. C. Rhodes

OBSTETRICS

Jaundice and False Positive Frog Tests for Pregnancy: Sobel, H. and Edelman, S., Am. J. Clin. Path., **21:** 950, Oct., 1951.

The male frog Rana Pipiens is widely used as a test animal for the detection of early pregnancy. Robbins and Parker reported a false positive reaction in a woman with intense jaundice caused by an obstructing stone, early biliary cirrhosis and acute hemorrhagic pancreatic necrosis. Bile added to urine and injected into frogs did not produce spermatic emission. The authors obtained a positive test with a concentrate of urine from a woman with infectious hepatitis, followed by two negative tests. It was decided to make tests with urine from both males and females with jaundice.

Urine specimens obtained from 21 patients with an elevated icterus index were concentrated by the method of Brody. Frogs injected with negative extracts were tested for their ability to respond to 50 I.U. of chorionic gonadotropin.

The urines of 9 of the 21 patients gave a positive test which was not necessarily associated with parenchymal liver damage nor degree of jaundice, and negative urines were from patients exhibiting similar types of obstructing and parenchymal jaundice with approximately similar ranges of icterus index.

The active material is unknown but bears a similarity to pituitary gonadotropin in that it is inactivated when eluted from kaolin with sodium hydroxide. However, assay tests failed to show an increased excretion of gonadotropin in the positive urines.

J. Knowles

SURGERY

Therapy of Traumatic Shock: Burbank, B., Ann. Int. Med., **35:** No. 4, Oct. 1951.

This article deals with shock due to many causes. The section on shock due to thoracic injury will be considered here.

In chest injury shock is probably produced by vagal impulses causing bronchorrhea and bronchospasm, rarely hemorrhage. Patients are dyspneic, cyanosed, and coarse, dry and moist bronchial râles are heard. The patient may seem to be suffering from bronchial asthma. These events produce anoxia in distal alveoli, with resultant transudation of fluid into alveoli which appears clinically as a moist, persistent, ineffectual cough. Pain further increases anoxia by limiting movements of chest wall. In addition, an accompanying pneumothorax or hemothorax may depress the vital capacity of the lung by compression. Because of anoxia the patients are apprehensive and restless.

Therapy. There is a tendency to treat restlessness and pain with liberal administrations of narcotics. This can only lead to complications. Narcotics depress respiratory centre and cough reflex, whereas these patients can drain their wet lungs only by effective coughing. In many instances relief of pain is sought by splinting fractured ribs. This practice is condemned completely on the grounds that it is unphysiologic—it impedes respirations. In addition, it is rarely effective. Pain is best relieved by intercostal or paravertebral sympathetic block with novocaine. It is effective, respiratory movements become more efficient, and coughing is more effective. Also, nerve block breaks the vicious cycle—the vagal overactivity subsides, and many patients are restored to normal physiological status in a short period of time.

Oxygen administration is important. A No. 12 nasal catheter with a few additional perforations inserted well into the oropharynx is the most efficient method of administration.

In many patients, in spite of adequate nerve block and oxygen therapy, wet lung persists, especially in those treated late. The secretions in the respiratory passages require aspiration in these cases, and often this is a life saving procedure.

All abnormal mechanical pressure must be removed. If no air entry is heard, a thoracentesis is immediately performed and the air or blood aspirated vigorously. The concept that the pneumothorax and hemothorax act as a tamponade to prevent further bleeding is fallacious. Early and vigorous aspiration restores the function of the lung, diminishes incidence of empyema and does not lead to recurrent bleeding.

If the stomach is distended, a Levine tube should be passed and the stomach decompressed.

S. Hecker

The Surgery of Parotid Tumors: Shucksmith, H. S., et al., B.M.J., **4735**: 830 (Oct. 6) 1951.

The authors describe a new method of surgical treatment of parotid tumors the basis of which is the preservation of the facial nerve with, at the same time, wide resection of the parotid tumor, by exposing first the main trunk of the facial nerve soon after its emergence from the stylomastoid foramen and then working forward to the main divisions and filaments as need be.

The parotid and temporo-mandibular regions are infiltrated with local anesthetic to help hemostasis. The incision is liberal, extending from Macewen's triangle a fingerbreadth behind the pinna and just below the external auditory meatus down to the lower border of the mandible; flaps are dissected. The outer border of the tympanic plate is exposed and main trunk of the nerve found ¼ inch below; the nerve is dissected anteriorly, and in this forward sweep there is no confusion between fine filaments of nerve, fibrous tissue septa, and tiny ducts. The tumor is now excised widely, and after hemostasis the wound is closed with an intracuticular stitch and drained.

A. Halpern

Diverticulitis of the Colon and Its Surgical Management: Neal, J. W., Surgery, **30**: 606, Oct., 1951.

The author believes that surgeons meet this condition frequently and therefore proper management of surgical complications should be appreciated. Several cases with suitable comments are included to demonstrate methods of treatment and prognosis. Surgical interest in colonic diverticulitis was not aroused until 1907, when W. J. Mayo first reported treating 5 cases by resection of the sigmoid. The etiology is unknown but probably is an inherent weakness of muscular walls together with increased intracolonic pressure. The symptoms are variable, depending on the location in the colon, the degree and extent of the inflammatory process. The condition is often referred to as a "left-sided appendicitis." Right-sided lower abdominal signs and symptoms are often present. The diagnosis depends on roentgen demonstration of diverticula. At times differential diagnosis cannot be solved preoperatively.

Between 15-20% of patients with diverticulitis require surgery. Six general indications for surgery are: (1) acute perforation, (2) abscess, (3) obstruction, (4) fistula formation, (5) co-existing carcinoma, (6) inability to differentiate this from carcinoma. Bowel resection should not be undertaken in the presence of an active inflammatory process. When complete obstruction or fistula formation is present, a colostomy should be made. When carcinoma cannot be ruled out, radical resection is indicated.

The surgical management of diverticulitis has not been ideal. It calls for individualization, good judgment and patience on the part of the surgeon.

M. Wasylenki

Pheochromocytoma: Decker, H. C., et al., J.A.M.A., **147**: No. 7, 642, 1951.

Pheochromocytoma, a tumor of the chromaffin cells of the adrenal cortex or other chromaffin tissue, has long been considered a medical curiosity. Cases are nearly all diagnosed at autopsy. As surgical removal has been very often successful and as without this death will ensue, it is important to distinguish this condition from diabetes, hyperthyroidism and hypertension. In diagnosis the whole clinical picture must be considered. This is essentially due to persistent or intermittent action of adrenalin in consequence of its overproduction and includes hyperglycemia, high metabolic rate, postural hypotension, peripheral vasomotor disturbances, and paroxysmal attacks of headaches and hypertension.

A case is presented that illustrates many of these features. The most dramatic symptoms were paroxysmal excruciating headaches during which the blood

pressure would rise to as high as 230/100. Diagnosis was made on the basis of the clinical picture, supported by a dibenamine test. Injection of this adrenergic blocking agent caused prolonged remission of the paroxysmal hypertension. The authors considered this a very useful diagnostic test, emphasizing that the usual histamine test, in which injected histamine usually induces a marked rise in blood pressure, failed to demonstrate the condition. In their opinion dibenamine should not be given immediately before the operation. The adrenalin would then be unable to control the hypotensive state resulting from the clamping of the blood supply to the tumor. The tumor was successfully removed using the transperitoneal approach. J. B. Redford

PEDIATRICS

Retroperitoneal Teratomas in Infancy and Childhood: Arnheim, E. E., Pediatrics, 8: No. 3, 309, 1951.

The author reviews the 44 cases in the literature of this, the third commonest group of retroperitoneal tumors in infants, and describes 3 cases. The origin and pathology of teratomas are also discussed.

Of the cases discussed, over 50% were less than one year of age and 60% were females. Clinically, early symptoms were mainly the result of pressure, with later development of fever, vomiting, anorexia, weight loss and constipation. Abdominal enlargement and a palpable mass were the commonest physical findings, occasionally associated with dilation of the veins of the abdominal wall. In diagnosis, the condition must be differentiated from neuroblastoma sympatheticum and Wilms' tumor. The treatment by operative removal is described briefly. Although operative mortality has been high (29% in 31 operations), this figure includes cases prior to 1930. More recently, adequate preoperative and postoperative management have changed the prognosis considerably. All 13 of the cases reported in the literature as untreated died. In the series, 6.8% of the teratomas had undergone malignant changes.

T. R. H. Box

Effect of Cortisone and Corticotropin (ACTH) on the Acute Phase of Rheumatic Fever: Barnes, A. R., et al., Am. J. Diseases of Children, 82: No. 4, 397, 1951.

14 cases of rheumatic fever, 10 of which were treated with cortisone and 4 with ACTH are discussed. These hormones neither cured the disease nor shortened the duration of the acute rheumatic state. But the acute manifestations of rheumatic fever were suppressed as long as administration of hormone was continued. When this was stopped, exacerbations recurred until the disease completed its usual course. Adequate amounts of hormone given early are most effective in combatting the acute phase. Reduced amounts given continuously or in courses should be administered until there is no doubt that the condition has run its course.

It is still too early to determine whether, in these 14 cases, there has been any permanent cardiac damage. However, on examination of 11 of the 14 cases one to ten months after leaving the hospital, 6 had no cardiac murmurs or evidence of cardiac enlargement; 5, where clinical evidence of carditis was present before the administration of cortisone, seemed definitely to have benefited from the hormone therapy.

Other effects observed were marked improvement in appetite and morale, gain in weight, temporary production of moon-shaped facies, appearance or aggravation of acne, occurrence of reddish-purple striations over the thighs and buttocks, and amenorrhea among patients whose menses had become established.

It is hoped by the authors that early adequate administration of cortisone or ACTH, while it does not render patients immune to recurrent attacks of rheumatic fever, will prevent or markedly minimize permanent cardiac injury in the large majority of cases.

S. B. Eisen

NEWS AND NOTES

Medical Society

At the recent Medical Society by-elections, at which 69% of the student body cast votes, Abe Chaplan, of 2nd medical year, was chosen as the treasurer of the Medical Society. Sandy Lowden, president of 1st pre-meds, is another new member of the Medical Society for the year 51-52.

* * *

Dr. Wm. Kendrick who is demonstrating in the Gallie course has been presiding as chairman of the Medical Society. This arrangement allows the elected president of the Medical Society to take full part in the discussion.

* * *

Medical students, busy as they are, still find time to be active in the other university functions. Walt MacKenzie, a 4th year medical student, has the responsible position of editor of Torontonensis this year.

* * *

Miss S. Nabeta 1st pre-med, has won the Samuel Godfrey Scholarship.

* * *

The annual Soph-Frosh Dance was held on Thurs., Oct. 25th at the Top Hat. About seventy-five couples attended. Those present enjoyed the dance very much but were disappointed in not meeting many 1st pre-medical students there.

* * *

Fourteen students were honoured in becoming new members of Alpha Omega Alpha, the honour medical society. These are: R. J. Angus, Miss S. M. Baker, P. Freeman, G. D. Hart, J. R. Hilliard, T. A. Nugent, P. S. Rosen, T. L. B. Walker, and P. J. V. Woollacott, of Meds 5T2; R. O. Antoni, H. Fields, G. Y. Hiraki, P. G. Urback, and H. J. Watt, of Meds 5T3.

* * *

The Medical Arts and Letters is to be congratulated on the regeneration of two societies this year—the Medical Music Association and the Debates Committee. Various challenges made by other faculties promise to keep the Debates Committee active. Their executive is also planning further noon-hour debates on serious and light topics along the lines that were established last year.

* * *

C.A.M.S.I.

Milt Francis, president of Toronto C.A.M.S.I. reports that the recent conference held at Queen's University fully accomplished its purposes. At this conference the C.A.M.S.I. executive of Laval University was appointed as the new national executive. Jacques Baillargeon of Laval, is the new national president of C.A.M.S.I. Queen's University undertook the publication of the C.A.M.S.I. Journal, while the University of Toronto executive of C.A.M.S.I. will conduct the Interne Placement Service.

* * *

Of interest to all medical students is the problem of standardization of medical degrees from different Canadian universities. This problem was discussed at the conference and is to be thoroughly investigated this year.

* * *

The trophy donated annually by the Chas. E. Frosst Co. for the best Canadian medical publication was awarded to the C.A.M.S.I. Journal. 'Reality of Psychic Phenomena', an article by Dr. Campbell in the University of Manitoba Medical Journal was chosen as the best article.

* * *

Contributions by University of Toronto medical students to the annual art contest sponsored by C.A.M.S.I. were very noteworthy. John Speakman, 4th meds, was commended by the judges for his fine oil painting. In the miscellaneous division, 'Rural Majesty', a kodachrome transparency by J. C. Stears of 2nd meds received honours.

* * *

FACULTY

At a recent meeting of the Chicago Surgical Society Dr. R. M. Janes was elected an honorary fellow.

* * *

Dr. Gordon Murray has returned from an extensive tour of Australia and New Zealand where he spent the summer lecturing and teaching. While in Australia he was the first McIlrath Guest Professor in Surgery at the University of Sydney.

* * *

Dr. Alan Brown has retired as physician-in-chief, Hospital for Sick Children and Professor of Pediatrics. Dr. Brown who will be Professor Emeritus, will remain active in pediatrics as a senior consultant. Dr. A. L. Chute will succeed Dr. Brown as Physician-in-chief H.S.C. and Professor of Pediatrics.

* * *

Dr. Stanley Graham, brother of the late Dr. Roscoe Graham and Professor of Child Health in the University of Glasgow, delivered the Vera Moberly Lecture on Wednesday October 17th. His subject was, "Infant Mortality and Advances in the Social Sciences".

* * *

The Phi Delta Epsilon medical lectureship will be presented at 5 P.M. on Monday December 3rd in the north lecture room of the medical building. Dr. Henry Bockus of Philadelphia will speak on, "Functional Disorders of the Gastro-intestinal Tract".

* * *

ALUMNI

The George Armstrong Peters prize for a notable contribution to surgical literature has been awarded to Dr. Ray O. Heimbecker for his work with Dr. Blalock of Johns Hopkins and Dr. W. E. Bigelow of Toronto. Dr. Heimbecker is at present on the interne staff of the Hospital for Sick Children.

* * *

Mr. Kenneth McCuaig of 1st pre-med has won the Medical Alumni Association Scholarship.

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MISS D. LIEBERMAN.
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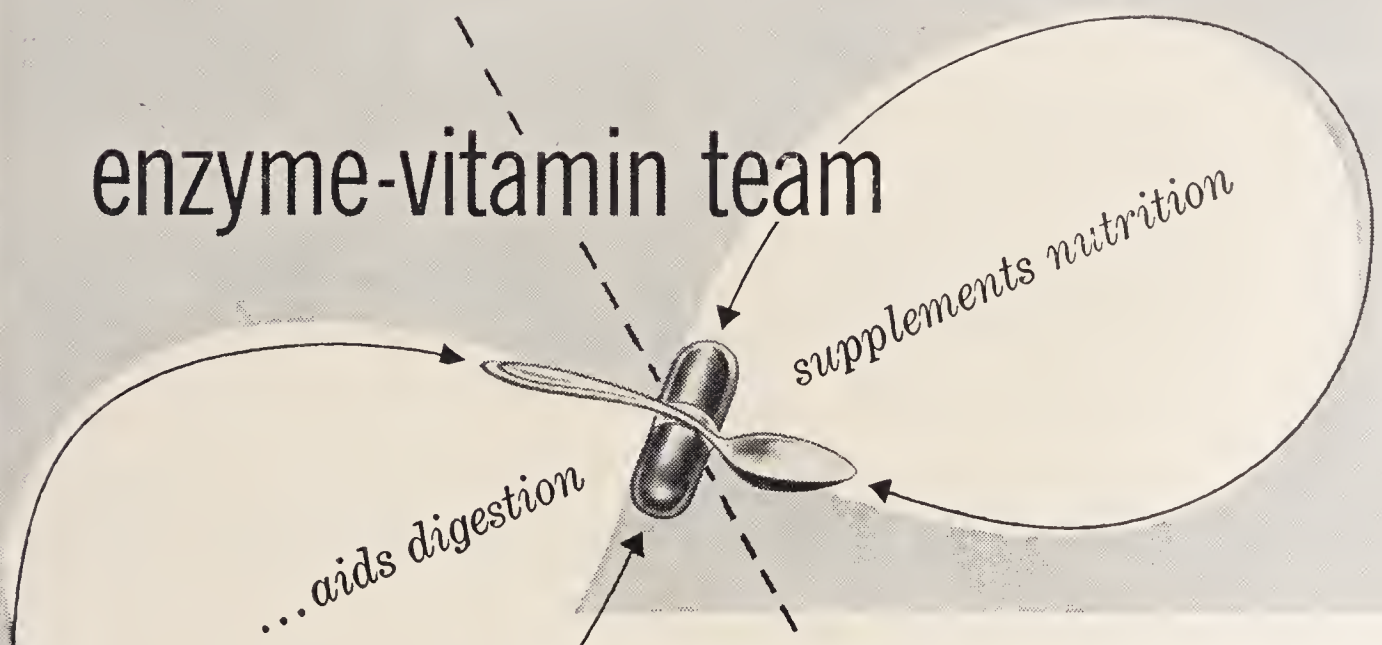

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Each teaspoonful (4 cc.) contains:

Taka-Diastase (*Aspergillus oryzae* enzymes)	2½ gr.
Vitamin B_1 (Thiamine Hydrochloride)	2 mg.
Vitamin B_2 (Riboflavin)	1 mg.
Vitamin B_6 (Pyridoxine Hydrochloride)	0.5 mg.
Pantothenic Acid (As the Sodium Salt)	2 mg.
Nicotinamide (Niacinamide)	5 mg.

In 16 ounce bottles.

PARKE, DAVIS & COMPANY

MEDICAMENTA VERA · P D & CO.

New Index of Arthritic, Rheumatic Therapies Reveals That Salicylates Provide Important Benefits of Cortical Hormones

...*With Safety!*

The remarkable similarity between succinate-salicylate (AMBERMIDE) therapy and cortical hormone therapy in the treatment of arthritic and rheumatic disorders is revealed in the AMBERMIDE "Index of Arthritic and Rheumatic Therapies—1951"—an up-to-the-minute report of findings of eminent authorities throughout the world.

The check-list opposite . . . based on material included in the "Index"... presents a point-by-point comparison of the two therapies.

And . . . of utmost importance to the administering physician . . . these findings prove conclusively that succinate-salicylate (AMBERMIDE) provides additional advantages:

- AMBERMIDE is safe for prolonged administration . . . distressing and sometimes-tragic side-effects are obviated.
- AMBERMIDE costs only a fraction of hormonal treatment.
- AMBERMIDE Tablets bring fast relief, are easy to take, do not induce gastric upset.
- AMBERMIDE Tablets are available at all leading drug stores. Bottles of 100 and 500 tablets . . . on physicians' prescription only.

These outstanding advantages make AMBERMIDE (succinate-salicylate) the therapy of choice in the treatment of arthritic and rheumatic disorders.

● READ THESE FACTS
BASED ON FINDINGS OF EMINENT AUTHORITIES

Beneficial Actions	Cortical Hormones	Succinate-Salicylate
1. Reduction of the content of ascorbic acid in the adrenal cortex.	YES	YES
2. Increase of the urinary excretion of uric acid.	YES	YES
3. Inhibition of the action of hyaluronidase.	YES	YES
4. Decrease of circulating eosinophiles.	YES	YES
5. Reduced production of serum gamma globulin and antibodies.	YES	YES
6. Decrease in allergic response.	YES	YES
7. Clinical relief of rheumatic symptoms.	YES	YES
8. Increase in tissue oxidation.	YES	YES
9. Promotion of phosphorylation.	YES	YES

● **YOURS:** We shall be pleased to send you a copy of the AMBER-MIDE "Index of Arthritic and Rheumatic Therapies—1951." Please write to Dept....., THE PAN PHARMACALS LIMITED, Toronto 10, Canada.

AMBERMIDE

Active Ingredients per Tablet
*O-Hydroxybenzamide ..2 gr.
Calcium Succinate.....2.8 gr.
Aluminum Hydroxyde ...1.7 gr.
Magnesium Hydroxide ..0.649 gr.
*Salicylamide

For Prompt Relief of Symptoms in Arthritic and Rheumatic Disorders

Rheumatic Fever • Sciatica • Gout • Bursitis • Neuritis • Fibrositis • Myositis

Ortho is proud to announce . . .

the new simple effective method of control

Preceptin®

VAGINAL GEL

used without a diaphragm

built on a new base

To replace the function of the diaphragm, a new and better physical barrier, incorporated into the Gel itself, was needed — one that could be depended on to cover the cervical os effectively. The new base of PRECEPTIN, achieved by blending recently developed synthetic gel-forming agents, meets this requirement, making it possible to do away with the diaphragm.

clinically proved

Of 3270 patients using Preceptin Gel — 99.2 percent received complete protection.

Preceptin's new base:

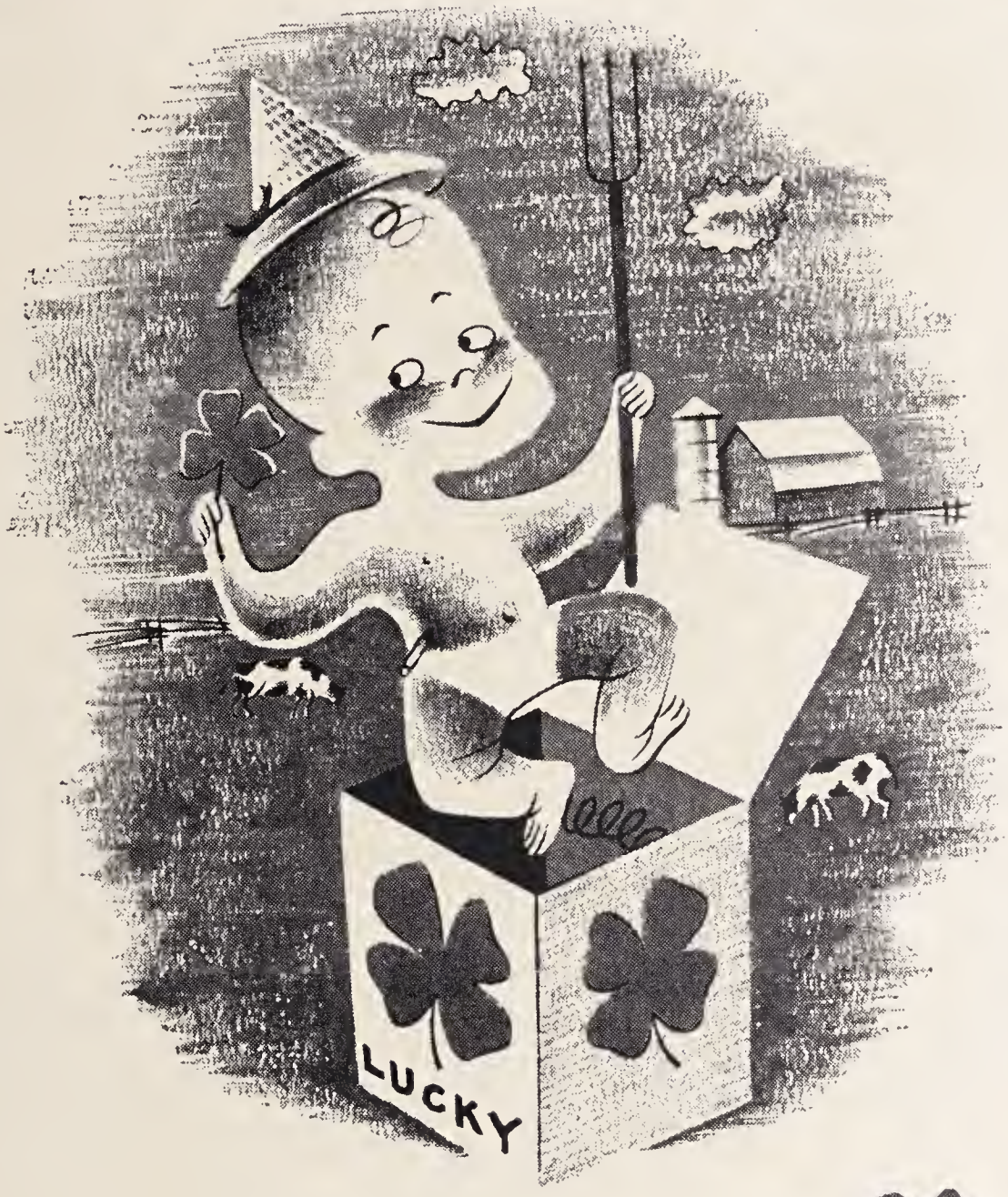
1. adheres well to the moist cervical mucosa — forms a persistent, adherent physico-chemical barrier over the cervical os.
2. is more miscible with semen — means greater spermicidal potency.
3. rapidly releases active spermicides — enables Preceptin to kill sperm on contact.

COMPOSITION: Preceptin contains the active spermicidal agents p-Diisobutylphenoxypolyethoxyethanol and ricinoleic acid in a synthetic base buffered at pH 4.5.

Ortho

Ortho Pharmaceutical Corporation

(Canada) Limited — Toronto, Ontario



Why Lucky?...

Lucky is the infant who starts
his life as an Infantol baby
For Infantol is complete protection
against vitamin deficiencies
during the formative years.

Infantol

ADVANTAGES

1. complete protection
2. water-miscible
3. pleasant to take
4. inexpensive

frank w. horner limited

All-Around Vitamin Supplementation for the "*active ages*"

3 water-soluble liquid vitamin preparations . . .

Mead's three Vi-Sols provide flexibility in choice of vitamins to meet the varying needs of the "active ages", combined with an unusual palatability that assures patient acceptance.

	VITAMIN A	VITAMIN D	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACINAMIDE
POLY-VI-SOL each 0.6 cc. supplies:	5000 units	1000 units	50 mg.	1 mg.	0.8 mg.	5 mg.
TRI-VI-SOL each 0.6 cc. supplies:	5000 units	1000 units	50 mg.			
CE-VI-SOL each 0.5 cc. supplies.			50 mg.			

Available in 15 and 50 cc. bottles

MEAD'S

MEAD JOHNSON & CO.
OF CANADA, LIMITED
BELLEVILLE, ONTARIO

TWO TRIPLE SULFONAMIDE COMBINATIONS THAT PROVIDE EFFECTIVENESS WITH RELATIVE SAFETY

"TRULFA-ZINE" and "TRULFA"

Brands of triple sulfonamides

- **Additive anti-bacterial activity.**
- **Minimal hazard of toxic reaction, especially crystalluria.**
- **No need for adjuvant alkali administration.**
- **Rapid effect—components of the mixture pass rapidly into tissue fluids.**
- **Prolonged action — because of sustained blood levels.**

Complete therapeutic information and clinical samples on request.

"TRULFA-ZINE"

A combination of Sulfamethazine, Sulfadiazine and Sulfamerazine.

SUSPENSION Coloured yellow.

Each fluid ounce (28.4 cc.) contains:

Sulfamethazine..... 13⅓ gr. (0.86 G.)
Sulfadiazine..... 13⅓ gr. (0.86 G.)
Sulfamerazine..... 13⅓ gr. (0.86 G.)

Each dram (3.5 cc.) contains a total of 5 gr. (0.3 G.) of sulfonamides.

DOSE Infants, 1 to 2 years — ½ to 1 dram; Children, 3 to 10 years — 1 to 2 drams; Adults, 2 to 4 drams; in water every four hours.

MODE OF ISSUE 16 fluid ounce bottles.

TABLETS C.T. No. 810 "Frosst"

Coloured yellow–scored for easy division.

Sulfamethazine.... 0.166 G. (2 3/5 gr.)
Sulfadiazine..... 0.166 G. (2 3/5 gr.)
Sulfamerazine..... 0.166 G. (2 3/5 gr.)
A total of 0.5 G. (7½ gr.) of sulfonamides.

DOSE 1 to 2 tablets with water every 4 hours.

MODE OF ISSUE Bottles of 100 tablets.

"TRULFA" Suspension and Trulfa Tablets are similar in formula to the above, except that sulfathiazole is used instead of sulfamethazine.

"TRULFA-ZINE" TABLETS

C.T. No. 811 "Frosst"

Coloured yellow.

HALF-STRENGTH FOR CHILDREN.

Each tablet contains a total of 0.25 G. (3¾ gr.) of sulfonamides.

DOSE

1 to 3 tablets with water, 3 times daily.

MODE OF ISSUE

Bottles of 100 tablets.

Frosst
SINCE 1899
THE SYMBOL OF PROGRESS
IN PHARMACEUTICAL RESEARCH

Charles E. Frosst & Co.
MONTREAL CANADA

ADEQUATE • AQUEOUS • ACCEPTABLE

"OSTOCO" DROPS

Multivitamin Therapy for Infants and Children

Ostoco Drops act to prevent rickets and scurvy, promote normal metabolism and protect against iodine deficiency. Pleasantly flavoured Ostoco Drops diffuse perfectly in fruit juices, milk and other fluids, or may be given directly onto the tongue.

"OSTOCO" DROPS

Ingredients:

Vitamin A	8000 I.U.
Vitamin D	4000 I.U.
Thiamine HCl	4 mg.
Ascorbic acid	120 mg.
*Niacinamide	10 mg.
Sodium iodide	0.02 mg.

*Not declared on label.

Complete therapeutic information and clinical samples on request.

ADMINISTRATION

Infants: 5 to 10 Ostoco Drops (0.25 to 0.5 cc.) added to one feeding bottle of the day's supply when cool. Shake well and use this bottle for the next feeding.

Children: 5 to 10 Ostoco Drops (0.25 to 0.5 cc.) daily.

MODES OF ISSUE

Bottles of 8, 15 and 30 cc., with calibrated dropper.

Frosst
SINCE 1899
THE SYMBOL OF PROGRESS
IN PHARMACEUTICAL RESEARCH

Charles E. Frosst & Co.
MONTREAL CANADA

*Today's outstanding**

ANTACID
AND
GASTROINTESTINAL ANTISPASMODIC
ANCATROPINE GEL

* An efficient antacid adsorbent without tendency to constipate.

* An effective buffer for over two hours without carrying gastric juice pH above upper limits of physiological range.

* Relieves spastic pain without producing undesirable side effects.

* Contains the barbiturate of choice for prolonged daytime sedation. May be administered in presence of renal damage and is nontoxic to the liver.

FORMULA

Each fluid ounce represents

Aluminum Hydroxide Gel U.S.P. X111	1 fluid ounce
Magnesium Hydroxide	13 grains
Homatropine Methylbromide	0.1 grain
Butylbarbituric Acid	0.666 grain

Supplied in 12 fluid ounce dispensing bottles.

Anglo-Canadian
DRUG COMPANY LTD., Oshawa, Canada

ANCA

Healing time is cut by half with

Triple Sulfa Cream
TRADE MARK

In a recent study[1] of 200 consecutive cases of vaginal and cervical surgery treated post-operatively with Triple Sulfa Cream average healing time was actually reduced 50 per cent. In all instances speculum inspection disclosed "a clean granulating surface without a superficial membrane attached, and no apparent slough present," with resultant complete absence of malodorous vaginal discharge. Among 121 cases of cervical conization not a single instance of post-operative occlusion occurred.

Triple Sulfa Cream, compounded of three selected sulfonamides, each with its own pH range of maximal activity, exercises potent antibacterial action against all the common wound pathogens. By reducing wound infection to a minimum, Triple Sulfa Cream as a post-operative dressing, promotes sound structural healing, shortens hospitalization, and simplifies nursing care.

In many forms of vaginitis and cervicitis, also, Triple Sulfa Cream brings prompt relief of symptoms by virtue of its powerful bacteriostatic and bacteriocidal action at the actual site of invasion.

1. Marbach, A. H.: Am. J. Obst. & Gynec. 55: 511, 1948.

Triple Sulfa Cream is available in 3 ounce tubes, with or without the Ortho applicator.

Ortho **Pharmaceutical Corporation**
(Canada) Limited Toronto, Ont.

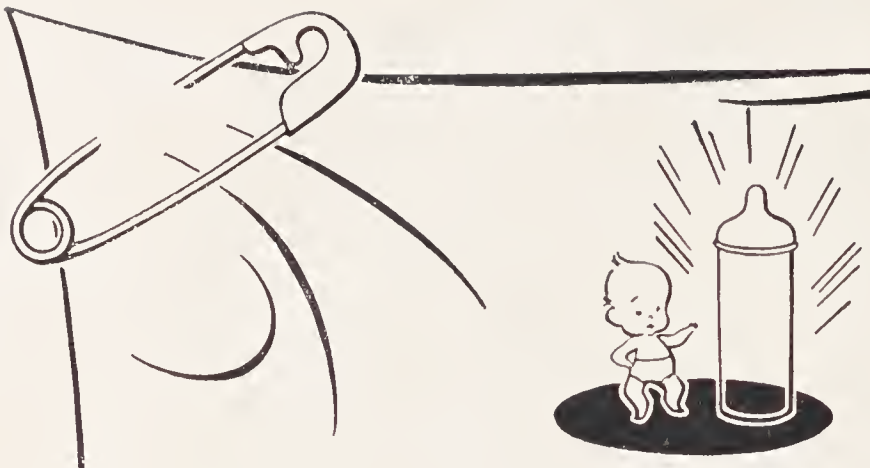
You can't fool an expert. Babies don't usually write M.D. after their names. They are not properly "qualified" experts, but they certainly know what they like in Baby Foods. Most of them like Heinz.

Every variety of Heinz Baby Foods is under constant inspection from start to finish of its preparation. Meats, fruits and vegetables are carefully chosen and these are expertly cooked and specially packed to retain nutrients in high degree. An army of graduate chemists and food technicians exercise rigid Quality Control—using scientific equipment to test the tenderness and quality of ingredients, analyse vitamin content, check the purity and texture of the final product.

Because of this continuous vigilance, Heinz Pre-Cooked Cereals and Baby Foods can always be safely and confidently recommended for the babies in your care. Samples will be sent on request, together with booklets, charts and other material expressly prepared for the use of doctors, nurses and dietitians.
Write H. J. Heinz Company of Canada, Ltd., Dept. S.P., 420 Dupont St., Toronto 4, Ontario.

Heinz

Makers of Baby Cereals • Strained Foods • Junior Foods



When Lactation Fails

℞ LACTOGEN®

When the supply of breast milk is inadequate or when lactation fails entirely, there is no better formula than Lactogen. Designed to resemble mother's milk, it consists of whole cow's milk modified with milk fat and milk sugar. It differs, however, in one important respect: the protein content of Lactogen in normal dilution is one-third greater than that of mother's milk—2.0% instead of 1.5%.

A Complete Infant Formula In One Package

Lactogen contains all the ingredients of a well-balanced infant formula.

Easily Prepared . . . Merely Add Water

Lactogen is simple to use. The prescribed amount is stirred into warm, previously boiled water. Either a single feeding can be prepared, or the entire day's quantity can be made up and stored in the refrigerator until used.

NESTLÉ'S MILK PRODUCTS (CANADA) LIMITED
80 KING ST. WEST, TORONTO 1, ONTARIO

ACCEPTED BY THE COUNCIL ON MEDICAL ALLIED PRODUCTS

NOTABLY HIGH IN PROTEIN CONTENT

Lactogen contains a generous amount of protein . . . more than enough to satisfy every protein need of the rapidly growing infant.